The Gas Journal

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Editorial Notes

The Gas Unit

THE question of the adoption by the Gas Industry of a unit smaller than the therm is, of course, not a new one. For many years the idea has been put forward that the gas salesman is gravely handicapped in competition with electricity when the electrical salesman impresses upon the public that electricity is ½d. a unit and speaks at the same time of 8d. or 10d. gas. Advocates of the gas unit maintain that the gas salesman would have a far better chance of securing new business if he could quote gas at a figure more comparable with that of the electrical unit. The question was really brought out into the open in May of 1930, when Mr. R. D. Keillor, of Greenock, staunchly advocated in the "GAS SALESMAN" the adoption of the small unit and urged the Gas Industry to lose no time in coming to a decision as to what this unit should be. Mr. Keillor's plea was followed up immediately by Radiation Limited, who, in our columns, set out the case for the adoption of a gas unit of 4,000 B.Th.U.

There followed in the "JOURNAL" a great deal of correspondence for and against such a plan, and it became apparent that a decision must first be reached as to the exact number of B.Th.U. which the gas unit ought to represent. Several undertakings had already instructed their salesmen to work on the basis of 4,000 B.Th.U. Others had adopted a unit exactly equivalent to the electrical unit—namely, 3,412 B.Th.U. The National bodies—the National Gas Council and the Institution of Gas Engineers—got together, and after much discussion arrived at the conclusion that if a smaller unit was desirable then this unit should be one of 4,000 B.Th.U.

There are those who believe that a small unit cannot be of much benefit to the Gas Industry, and that its adoption—which must, of course, be in addition to the Board of Trade therm—can only make confusion worse confounded. They maintain that what the consumer wants to know is how much an appliance costs to run, and that without any reference to a new unit the gas salesman, knowing the calorific value of his gas and the price per thousand cubic feet, can quite easily give him this information. They argue that in the showroom and on the district, thousands of cubic feet, therms, or kilowatt hours have very little bearing on the making of sales, whereas a straightforward statement about pence per hour, or pence per day, really cuts some ice. And in any case the final test must remain the total amount of the bill presented; if gas gives service equal to electricity, but at a lower cost, then gas will hold the field. The advocates of the gas unit retort that in regard to new business a gas bill might never be rendered but for the unit—that the salesman could not have clinched the deal.

A Case for Collaboration

THEORETICALLY it is difficult to appreciate the value of a small unit, but if in practice the salesman does find that the small unit is of assistance to him in meeting and overcoming competition then our Industry would be well advised to lose no time in adopting the idea. The solution should rest, however, upon the opinion of the salesman in the showroom and on the district; his voice, we suggest, is of far more value in arriving at a wise decision than are round table conferences of executives who are not actually selling appliances and cannot truly appraise what effect the electricians' ½d. unit talk has on the mind of the consumer. Here is a first-rate case for collaboration between chiefs and their staffs. We also suggest that much good might come of unfettered discussion by the salesmen themselves at Circle meetings.

So far we have dealt with the matter purely from the point of view of the salesman being able to talk about the cheap gas unit. Those in favour of the small unit have another argument to put forward—namely, that its adoption would make it much easier for salesmen to quote consumers the running costs of appliances. More and more, ratings of apparatus are in terms of heat input. For example, as Radiation Limited have pointed out, a gas fire radiant is heated at a consumption of about 2,000 B.Th.U. per hour. Hence, with the adoption of a gas unit of 4,000 B.Th.U., each radiant takes half a gas unit an hour—a fact which simplifies matters for the gas salesman. They have also shown that, taking efficiencies of appliances into account, the 4,000 unit compares very closely indeed with the electrical unit of 3,412 B.Th.U. Some time ago, in fact, they published a little green booklet making out a good case for the 4,000 unit in various fields of gas service.

A Lead Needed

FOR our own part we should have preferred a gas unit of 3,412 B.Th.U.—a unit exactly comparable with the electrical unit. The 4,000 unit is purely arbitrary and has no scientific foundation. On the other hand, the electrical unit has a scientific basis. In either case the gas unit must be calculated to several places of decimals. We should have liked to be able to say: "Here is the gas unit, precisely the same as the electrical unit"—and leave the efficiencies to look after themselves. Here, again, however, if the 4,000 unit helps the salesman in comparing costs of electricity and gas in practice, then we could not quarrel on a point of nicety; and, as we have maintained over and over again in the pages of the "JOURNAL," there must be uniformity throughout the Industry.

As things stand at present, the National Gas Council

appear to have no opinion as to the desirability of introducing a small unit. All they say is that if individual undertakings think that the gas unit would help, then they should go ahead with it, and adopt a unit of 4,000 B.Th.U. We suggest that the time is ripe for a definite recommendation for or against. A number of undertakings, too, are known to have had units of one kind and another in use over a sufficient period of time for a thorough test of their worth, and their experiences would make an invaluable contribution to discussion of the question.

The Psychology of It

As we have suggested, the appeal of the gas unit is psychological. Yet, on grounds of psychology it has its disadvantages. The basis of gas measurement is the cubic foot. The calorific value of the cubic foot multiplied by the number of cubic feet measured by the meter and divided by one hundred thousand gives the therms consumed. Cubic feet appear on the gas account, and so do therms, together with an arithmetical apologia. Are we to add to the bill the number of units consumed, and an explanation of what a unit is, and why 4,000 B.Th.U. is so much better than 3,412—the figure which appears on all electricity accounts? Or are we to ignore the gas unit altogether when presenting the bill? A consumer, we take it, is " sold " on the gas unit. With the wonders of the gas unit in mind, he receives his bill, and finds no mention whatever of units. Is this psychologically sound? Will the consumer be inclined to regard the whole business as a piece of jiggery-pokery?

Just one more point. A therm of gas is capable of quite a lot of work. Its capacity, in fact, has served well in extensive propaganda for the Industry. Suppose a domestic consumer takes 40,000 c.ft. a year—with gas of 500 B.Th.U. calorific value, a matter of 50 therms per quarter. Is the psychological effect of 1,250 " units " better than that of 50 therms?

Views from America—

Last week, referring to our Third Institution Number, which contained all the written contributions to the discussions on the papers presented at the June meeting of the Institution of Gas Engineers, we mentioned that leaders of the Gas Industry in America are among the contributors to the discussion on Mr. Carmichael's paper. We again call attention to this, for there can be no doubt, in particular, of the value of the observations of Mr. Hugh Cutherell, of the Brooklyn Union Gas Company, Mr. Arthur Hewitt, of the Consumers' Gas Company of Toronto, and Mr. Clifford E. Paige, in that they have a decided bearing on possible future policy of the Gas Industry in Great Britain. As our readers are aware, all three papers giving impressions of the Gas Industry in Canada and the United States urge the co-ordinating of our national bodies to obtain the same driving force as exists in America. A British Gas Association is envisaged. We discussed this question fully in our issue for June 20, and we have nothing to add on the present occasion. We would, however, underline what both Mr. Cutherell and Mr. Paige have to say on the matter, and also call attention to the reply of Mr. Carmichael, who has now more adherents to the policy of unification.

Mr. Paige, it will be recalled with pleasure, was with us at the First International Gas Congress held in London in the June of 1931. Addressing that meeting he held his audience spellbound by his fluent and forceful interpretation of what the American Gas Industry was doing to develop gas sales and afford its consumers a truly modern service. Now Mr. Paige, during his visit here, had an excellent opportunity of gaining a good idea of our methods, and we are quite sure that our readers will respect his views. He firmly maintains—and his colleague Mr. Cutherell is with him—that the Gas Industry here would profit by an organization of the kind which exists in America. We gained the impression in 1931 that the American Gas Industry plans its work ahead far more efficiently than we do, and this impression is reinforced by the papers prepared by our delegates to Canada and the United States last year.

and British Support

Mr. Carmichael strengthens his paper by his reply to the discussion. He points out that the A.G.A. is always five years ahead with its schemes of development, and any paper, or line of investigation, is part of a co-ordinated programme. Technical circulars are sent out monthly on all subjects, and " the information is in the hands of the gas undertakings almost before it is wanted." Our national bodies, Mr. Carmichael continues, might well provide similar data. If they did, " there would be less adverse criticism of their work and a service of the greatest possible assistance would be rendered." At present, he thinks that there is lack of lead on many important problems. Mr. Carmichael, we suggest, should in fairness have mentioned that the National Gas Council does issue monthly reports, and that the Development Centres, linked up with a Central Information Bureau, already are in a position to afford their members a great deal of absolutely up-to-the-minute information on industrial and commercial problems. The Joint Co-ordinating Committee, says Mr. Carmichael, is doing excellent work—which implies that there was not the desirable amount of co-ordination before this Committee was set up. Even now, however, " one thing is perfectly certain—that a better getting together of the national gas organizations is desirable." There we will for the moment leave the question, again expressing the hope that the Gas Industry of Great Britain will not fall into two camps but will do all possible to present a united front.

Trader Co-Operation

Another matter of vital interest was mentioned in two of the papers on the American Gas Industry—the fact that our friends across the Atlantic for the most part set great store by co-operation with outside contractors in the development of gas sales. It would appear desirable to extend this practice in this country, with due caution, let it be said at once. This is indeed a case for discrimination. One of the major advances of the Industry since the war has been the vast improvement in fitting work, and the Industry did the only possible thing in taking this work into its own hands, to provide adequate carcases and to ensure attractive as well as efficient fitting. Things are not yet all well with the Industry in this respect, but they are very different from the conditions which obtained in 1920; and on no account must any co-operative scheme with outside contractors result in inferior installations. Strict supervision by the gas undertaking is an essential factor for success.

The idea of co-operation is, however, an attractive one. At the Institution meeting Mr. Chandler, of Tottenham, commended the employment of outside contractors for the installation of appliances. By the employment of approved outside contracting firms an undertaking can establish a permanent staff of skilled fitters and retain

this staff irrespective of the amount of work the department is called upon to perform, and the necessity for the engagement of temporary employees to keep up with a rush of work is avoided. The Croydon Company provides another example of the value of co-operation with local traders. A form of agreement is signed registering the firm in question as sales agents of the Company, and terms are set out stating recognized commission on all orders taken or introduced by the agents, whether for hire or sale. The sales agent's agreement is extended to contractors employed in carrying out the district fitting work, augmented by the Company's own fitting staff, and employing in all a large number of fitters. The outside contractors become " gas-minded " and recommend gas appliances when otherwise they would have no interest. Supervision is given by the Company to cultivate the correct methods of work and—highly important—the way to conduct this work on consumers' premises.

"A Far, Far Better Thing . . ."

An example of what can be effected by dealer co-operation on the other side of the Atlantic is given by Mr. Cutherell in discussing Mr. Carmichael's paper. His firm belief is that the *only* manner in which modern gas appliances can be merchandized properly is for gas undertakings to engage in and supervise sales in co-operation with master plumbers and other reputable dealers; and he relates the experience of the Brooklyn Union Gas Company over the past twenty years. He acknowledges the advantages of the plan whereby undertakings make themselves solely responsible for sales and installation work—in particular, sales can be promoted from the load-building standpoint. This plan, however, besides encouraging dealers to concentrate on apparatus using other fuels, results in the installation by dealers of inefficient gas appliances purely on a price basis. After all, to a plumber who has no interest in the gas undertaking, a cooker is a cooker, and he is not concerned with anything else except the sale. The outcome is inevitably that the gas undertaking receives a flood of complaints and loses the goodwill of its consumers.

Twenty years ago the Brooklyn Company was " in the appliance business." During the war, for patriotic reasons, it was decided to leave this business to outside dealers. The result was by no means good, cheap and undependable apparatus being installed. In 1921 the Company re-entered the field and for several years conducted an educational campaign on the use of efficient apparatus. It was an uphill fight, but it was successful, and by 1929 it was considered reasonable to invite the co-operation of approved dealers. A comprehensive dealer co-operative plan was developed which welded some three hundred plumbers into a huge merchandizing unit working in harmony with the Company's own sales force. The plan provided that each salesman within his territory be responsible for the sales efforts of the plumber dealers in that area, and salesmen are paid a commission on all sales made by the plumbers. Everybody is, in fact, rewarded according to the work done, and every single employee of the Company is encouraged to assist in sales by being compensated for any productive lead according to a schedule.

" At the present time," says Mr. Cutherell, " as a result of our sales efforts and those of the dealers, we have about 39,000 refrigerators on our lines. These have a total annual gas consumption of 700 million c.ft. This is an entirely new load which does not replace any previously existing load. It has been developed practically entirely since the advent of the dealer co-operation movement in our territory."

Seals of Approval

Now there is a significant phrase in the contribution by Mr. Cutherell: " The quality of appliances sold by the utility is guaranteed by the American Gas Association Testing Laboratory. Consequently, when the plumber dealer co-operates with the utility in the sale of approved appliances, he too enjoys the assurance of a highly satisfied consumer which usually leads to repeat orders." If in this country there is a move towards greater co-operation with outside contractors, then the advantages of some seal of approval by a central laboratory become more pronounced. Such a seal would safeguard the consumer in his dealings direct with local retailers. As we suggested in our issue for June 20, the setting-up of a central laboratory in this country is well worthy of re-consideration.

En passant, we may mention that an important discussion on future outlook took place at the annual conference of the Electrical Contractors' Association just held at Burton. The *pièce de résistance* was an address by Sir William Ray, Executive Chairman of the Electrical Development Association, on " Co-operation within the Industry," and it is evident that the increase of co-operation between suppliers of electricity and outside contractors which is likely to develop will not by any means lessen the intensity of competition for the Gas Industry.

Faith in Advertising

" Good advertising goes hand in hand with salesmanship." Mark the qualification—" good." Any old stuff no longer suffices for the filling of space for which advertisers have to pay, and the same remark applies with equal force to space which is free. The truth of it is generally recognized nowadays, for there has been wondrous improvement in the art or science of advertising. Compare the advertisement pages of the " Journal " this week with those of half-a-century ago —by which time the " Journal " was already a firmly established periodical—and note the transformation. It is astounding. Compare them with those of only ten years ago. The transformation even in that period is remarkable enough. In the present year of Grace people go over the advertisement pages of their favourite papers, not as a matter of duty only, but for pleasure also.

If the first aim of an advertisement should be to attract, then one might place the appeal under one or more of three heads—beauty, dignity, and humour. But though, as the word " advertise " indicates, the first aim may be to attract attention, it is useless to have done this if a " lesson " be not also conveyed. " Bubbles " and " soap " were a definite and obvious " tie-up; " where there is abstruseness, one wonders whether an advertisement can have a 100% pull, for some potential customers—possibly good ones—may not care to tax their brains.

We are, however, getting away from our point, which was a sentence from a speech by the Prince of Wales at a dinner of the Advertising Association. His Royal Highness has made a close study of salesmanship, and it has brought him to a firm belief in the power of advertising. " Experience," he says, " has taught me that, just as unmined gold has no value, so are articles and manufactured goods hidden away in warehouses and factories useless until made known and made desirable by the art of advertising." This is good, sound common sense, which may be fearlessly commended to those who are wishful to build up a business or to increase a business already established.

PERSONAL

Sir FRANCIS and Lady GOODENOUGH have returned to London from Eastbourne, but have left again for the Pump House Hotel at Llandrindod Wells, where Sir Francis is taking the waters in the hope of completing his cure.

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The Quarterly Bulletin of the Institution of Chemical Engineers announces that Mr. ROBERT HENRY CLAYTON, M.Sc., M.Inst.Gas E., of the Manchester Oxide Company, Ltd., Miles Platting, has been elected a Member and Mr. WILLIAM OLIVER KIRKWOOD, A.M.Inst.Gas E., of the Hendon Gas-Works, Sunderland, an Associate Member of the Institution of Chemical Engineers.

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In his will, which was recently published, Mr. JAMES THOMPSON, of Seisdon Hall, near Wolverhampton, formerly a Director of Bilston Gas Light and Coke Company, senior Managing Director of John Thompson (Wolverhampton), Ltd., boiler makers, and a Past President of the Wolverhampton and District Engineering Company, left £115,267, with a net personalty of £113,806.

* * *

The Directors of the Berwick and Tweedmouth Gas Light Company have invited Mr. J. W. CARMICHAEL to fill the vacancy created by the death of Mr. R. R. Riddell (recently reported in these columns), who was for twenty years Chairman of the Company. Mr. HENRY COWEN has also been invited to join the Board in the place of the late Mr. Robert Boston.

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At St. Paul's Church, Oswaldtwistle, Mr. ERIC N. FARNWORTH, Assistant Gas Engineer at Oswaldtwistle, son of Mr. M. N. Farnworth, was married to Miss Margaret M. Ashcroft, daughter of Mr. Ashcroft, of Holywell.

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To celebrate his 83rd birthday, Mr. W. H. PRESTON, who has been for twenty years a Director of the Fleetwood Gas Company, recently entertained a party of friends at Haslingdon.

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Mr. A. WOOD, Chief Sales Accounts Clerk in the Warrington Corporation Gas Department, has been presented with an inscribed gold wristlet watch on his retirement.

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Mr. F. T. COOPER, who has been on the Burnley Gas Department's administrative staff for five years, has been appointed Showroom Manager at Workington.

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The Institution of Gas Engineers shared for some considerable time offices at 39, Victoria Street, Westminster, with the Junior Institution of Engineers, to their mutual advantage, Mr. WALTER T. DUNN being Secretary of each Society, until, in 1911, the work of both having increased to such an extent, Mr. Dunn resigned from "the Juniors" and continued with the Gas Engineers. Having been a founder of the younger Institution, he was, of course, honoured at the Jubilee Celebrations, which, commencing on June 27, continued till June 29. The actual date of the foundation was June 30, 1884.

OBITUARY

SUDDEN DEATH OF GAS COMPANY'S CHAIRMAN.

The death occurred suddenly at the end of last week of Mr. Oliver Melville, Chairman of the Innerleithen Gas Company, who only the previous evening attended several Committee meetings of Kirkcaldy Town Council.

Correspondence

The Oil-from-Coal Problem

SIR,—Prof. Bone's dispassionate survey of this question (reported in your issue of July 4) leaves few loopholes for criticism. While admitting the paramount potentialities of hydrogenation, it is noticeable, however, that he follows the usual tendency—namely, to look this particular "gift horse" rather more critically in the mouth than the other processes cited. Low-temperature carbonization spirit and motor benzole are as much competitors of imported petrol as hydrogenation spirit will be, yet one does not find the arguments hinging on the low price of imported petrol, subsidization of home producers by the petrol users, &c., used as reasons for discouraging low-temperature carbonization or discontinuing benzole recovery.

It is clear that at the outset hydrogenation is going to prove profitable to its exploiters, and the inevitable subsequent improvements and cheapening of the process should indicate a rosy future. Prof. Bone's cost figure assumes the use of hydrogen prepared by the destructive heat and steam treatment of rich hydrocarbon gases, presumably *plus* some water gas hydrogen, and he does not mention the very desirable alternative provided by coke oven gas hydrogen indicated in my letter of April 18. This provides for the use of "bottled" hydrocarbon gases elsewhere, and forms part of a proposal for the better utilization of coke oven gas, in the furtherance of which Messrs. Imperial Chemical Industries have promised their collaboration.

Yours, &c.,

L. H. SENSICLE.

Eccentric Club,
Ryder Street,
St. James's, S.W. 1,
July 9, 1934.

Gas v. Electricity: Corporation Flats

SIR,—In the issue of the *Electrical Times* of June 28 last, the following paragraph appeared:

> "AN EXPENSIVE GAS RING: Our gas rivals, realizing that they cannot compete with us on the basis of value for money received, are now concentrating on the appeal *ad misericordiam* and the appeal *ad legem*. Spilsby is a typical instance of the former method; from Worthing Mr. F. R. Cripps sends us an example of the latter. In the case of a dozen new flats all wired and plugged for complete electric service, one prospective tenant demanded a gas ring. It is costing the Corporation £60 to extend the gas main and make the necessary arrangements for this one gas ring."

No doubt this paragraph has been read by many members of the Gas Industry, and it might be of interest, therefore, to make known the true facts of the case.

(1) The Corporation Flats referred to are ten in number, and not a dozen.

(2) The Flats were originally "all-electric." As a result of what the *Electrical Times* are pleased to call the appeal *ad legem*, or, as the Company would express it, as a result of making it known that the Company's recent Act of Parliament enabled a municipal tenant to take either gas or electricity as he thought fit,
- 6 gas cookers have been installed.
- 4 gas cookers are being installed.
- 2 gas heated wash coppers have been fixed.
- 3 wash coppers are being fixed.

(3) The cost of running the supply, chargeable to the Corporation of Worthing, was £36 9s. 1d.

The above facts speak so plainly for themselves that comment is superfluous.—Yours, &c.,

HYDE C. BURTON,
Secretary.

Brighton, Hove, and Worthing Gas Company,
July 10, 1934.

By a Majority, the Linlithgow Town Council have turned down a proposal to convert certain street lamps in the burgh from gas to electricity.

Society of Chemical Industry.—The Fifty-Third Annual Meeting of the Society will be held at the Technical College, Cardiff, from July 16 to July 20, under the Presidency of Dr. J. T. Dunn.

Further Reductions in the price of gas are announced by the Kelty Gas Company. The new rates will be as follows: Ordinary meters, 3s. 8d. per 1,000 c.ft.; slot meters, 3s. 10d. per 1,000 c.ft.; industrial rates, 2s. 11d. and 3s. 1d. per 1,000 c.ft.

A Crude Benzole Recovery Plant is to be installed at the works of the Stockport Gas Department at a cost of £3,000. Sir Thomas Rowbottom, the Chairman of the Gas Committee, estimates that the plant will make a profit of £800 per annum.

From the Institution of Chemical Engineers we have received a copy of the second volume of their Transactions for 1933. This contains an account of the Eleventh Annual Corporate Meeting held in London last February under the Presidency of the Right Hon. Viscount Leverhulme.

The Annual Outing of the employees of Dougall's Gas Meters, Ltd., took place on July 7, when a party, numbering fifty, left for Hastings. At the luncheon at the Scotch Café, Mr. R. V. Steed called upon those present to honour the loyal toast. Mr. G. Sage proposed the toast, "Success to the Firm," and Mr. Steed suitably responded.

Sanction Has Been Received from the Ministry of Health to the raising of £5,000 for the construction of the new coke screening and coal handling plant at the Hinckley gas-works and also for the reconstruction of the water gas plant, in addition to the raising of a loan of £572 to cover the cost of alterations and additions to the gas showrooms in Castle Street.

The Entry Date for the Regent Exhibition has been extended to Aug. 31 from June 30. This change was brought about by the encouraging support which the Committee have received during the last few days. The extra time of two months should afford a chance to those members of publicity departments in the Gas Industry who have not already entered their efforts, owing to lack of time.

A Proposal to Sell Gas Appliances at Elgin's new municipal gas showrooms was strongly resisted at a recent Town Council meeting. Councillor Fraser, moving that the premises be opened as a showroom only, declared that the Council should not go in for municipal trading. Shopkeepers were hit badly enough and the town was amply catered for in respect of the type of goods that would be displayed in the new showroom. By 11 votes to 3, it was decided to sell appliances.

To Mark the Centenary of Galashiels Gas Company all employees are to receive a gift, together with £1 for each year of service. The services of Mr. Alexander Dow, the Engineer and Manager, are also to be recognized. The Company's output is now six times what it was when the new Galafoot works were established in 1868. Last year, 113 million c.ft. of gas were made and the price was 3s. per 1,000 c.ft. The Directors have reduced the price of gas by 2d. per 1,000 c.ft., the price to ordinary consumers being now 3s. per 1,000 c.ft., with 15% discount for special purposes.

Sanction for the Acceptance of a local tender by the Middlesbrough Corporation for the erection of a large new gasholder having been refused by the Ministry of Health, the Council has decided to send a deputation to the Ministry. The Council had accepted the tender of Messrs. Ashmore, Benson, Pease, & Co., a local firm, in conjunction with the Tees-side Bridge and Engineering Company, but the Ministry has stated that sufficient reasons have not been advanced for refusing to accept the lowest tender which was submitted by Messrs. Clayton, Son, & Co., Ltd., Leeds.

A New Balancing Tank Plant is to be inaugurated at the Greenbank Gas-Works, Blackburn—a scheme intended to prevent river pollution by effluents from the works. As a result of complaints by the Ribble Joint Committee, the Corporation prepared a scheme for the solution of the problem. To have carried it out would have cost £11,250. As a result of an interview with the Minister of Health, it was agreed that the Corporation should consider the provision of a balancing tank and controlling apparatus as a first step out of the difficulty. This provision has now been made and sanction given to borrow £2,392.

By the Casting Vote of Provost Dunbar, it has been decided by Bridge of Allan Town Council to secure the service of an actuary to report on their municipal gas-works. Bailie Campbell pointed out to the Council that the loss on the year's work was £1,311, and he moved that they reopen negotiations with Stirling Gaslight Company with a view to the latter taking over the concern. The Town Clerk said if the price was not sufficient to wipe out entirely the capital burden on the Undertaking the responsibility for the loss on the capital fund would rest upon the members of the Town Council, who approved of the sale of the works.

The Prince Regent Tar Company has been registered as a private company with a capital of £150,000 in £1 shares. It will acquire that portion of the undertaking carried on by Burt Boulton & Haywood, as tar distillers, at its Silvertown and Hertford works. The first Directors are: Oscar E. Boulton, Harold C. Smith, Engineer of the Tottenham and District Gas Company, William J. Sanderman, General Manager of the Croydon Gas Company, Alistair G. Saunders, and Walter C. Forbes. Messrs. Boulton, Saunders, and Forbes are Directors of Burt Boulton & Haywood. Mr. O. E. Boulton is to be Chairman so long as he remains a Director of the Company.

Amalgamation and Grouping.

A New Registration.

The registration has come to light this week of another Company which is evidently intended to amalgamate individual gas undertakings. Gas Consolidation, Ltd., has been formed with a capital of £500,000, divided into 250,000 4½% cumulative preference and 250,000 ordinary shares—all of £1 each. The names of the first Directors have been announced as Major Julian Day, Mr. F. H. James (Managing Director of the Imperial Continental Gas Association), and Major-General G. P. Dawnay.

Messrs. Dawnay, Day, & Co. announce that their recent purchases (as reported in the "Gas Journal") of majority interests in the Lichfield Gas Company and the Tamworth Gaslight and Coke Company were made on account of Gas Consolidation, Ltd.

It is understood that the Company's ordinary share capital will be privately subscribed by the Imperial Continental Gas Association, and by interests associated with Dawnay, Day, & Co., and that no public issue of capital need be expected in the near future.

South-Eastern Gas and Hastings.

The South-Eastern Gas Corporation announces that it has made an offer to purchase the whole of the issued ordinary stock of the Hastings and St. Leonards Gas Company. The terms of the offer are as follows:

For each £100 nominal value 5% converted stock of the Hastings and St. Leonards Gas Company, either—

(*a*) £165 in cash, or

(*b*) 50 redeemable 4½% cumulative preference shares, together with 80 ordinary shares of South-Eastern Gas Corporation, Ltd., both classes of £1 each, credited as fully paid.

For each £100 nominal value 3½% converted stock of the Hastings and St. Leonards Gas Company, either—

(*c*) £130 in cash, or

(*d*) 50 redeemable 4½% cumulative preference shares, together with 55 ordinary shares of South-Eastern Gas Corporation, Ltd., both classes of £1 each, credited as fully paid.

For each £100 nominal value 5% additional stock of the Hastings and St. Leonards Gas Company, either—

(*e*) £151 in cash, or

(*f*) 50 redeemable 4½% cumulative preference shares, together with 70 ordinary shares of South-Eastern Gas Corporation, Ltd., both classes of £1 each, credited as fully paid.

The offer is recommended for acceptance by the Hastings Company's Directors and is conditional upon its acceptance by the holders of at least 55% of the nominal value of the stocks. The offer closes on July 20 next and will be completed on Aug. 10.

The capital of Hastings Gas Company is £429,031.

Farnham.

The Farnham Gas and Electricity Company proposes to acquire the undertaking of the Bordon and District Gas Company, and is making application to the Board of Trade for a special order.

Severn Valley Gas Corporation.

A proposal to purchase the Malvern gas undertaking was reported upon at a meeting of the Malvern Urban Council

on Tuesday of last week, when it was stated that a letter had been received from the Severn Valley Gas Corporation, Ltd., inquiring whether the Council would be prepared to agree to a report on the whole matter being prepared, after which they would submit proposals to the Council for the acquisition of the gas undertaking. It was, however, decided not to entertain the proposal.

The Lighting of Sheffield.

Annual Report.

The Fourth Annual Report of the City of Sheffield Lighting Department contains, apart from much valuable information and statistics associated with previous reports, a historical review covering the last decade. The Lighting Department has now been for ten years an independent department of the Corporation, responsible directly to a Committee of the Corporation. Up to 1924, the administration of the Lighting Department was done by the Police Office staff.

Mr. J. F. Colquhoun, the City Lighting Engineer, in his Report states that mechanical control of street lamps was experimented with in Sheffield for some considerable time, and during 1925-26, the experimental stage was completed. From that date, the fitting of clockwork controllers for gas lamps, and time switches for electric lamps, has gone on steadily. By March, 1933, all the gas lamps and all the electric lamps, except those on the Stubbin and Brushes Estates, were mechanically controlled. The type of mechanical control for gas lamps most commonly used in Sheffield is clockwork operated, is set weekly, and usually wound weekly.

During the year the department used 81,808 gas mantles, and 20,564 electric lamps in the sizes 40w/200w, inclusive. The average effective life of the gas mantle during the year was 1,795 burning hours, and of the electric lamp 881 burning hours. This is an increase over last year of 195 hours in the case of gas mantles, but a decrease of 196 hours in the case of electric lamps.

The life of the small, inverted mantle, it is stated, is extraordinarily good. In the days of the old upright mantles, the average life was 270 hours. The life of the inverted mantle was always much greater, but has steadily improved from year to year. In the year 1926-27, the average life was 1,153 burning hours, and this has improved until the year ended March 31 last, when the average life was 1,795 burning hours. There are in all 15,722 gas lamps in use in the city, compared with 5,516 electric.

A few gas mantles from each consignment as received are tested in the Photometric Laboratory for size and candle-power, and a vibrating or shock test is applied also for likely durability. In December, 1933, 960 mantles of a special make were put on a life test on the street lamps. Ninety-six of these have been replaced, and although the test is still in hand, the average burning hours of the whole 960 mantles up to March 31, 1934, is 1,440. A test made of the light output on the horizontal plane, after 1,000 burning hours, shows a drop of 7% from the initial light output.

Forthcoming Engagements.

July 12.—Society of British Gas Industries.—Council Meeting, 2.30 p.m.
July 17.—I.G.E.—Meters Committee, 2.30 p.m.
July 18.—B.C.G.A.—Executive Committee Meeting, 11.30 a.m.; General Committee Meeting, 2.30 p.m.
July 23.—I.G.E.—Liquor Effluents and Ammonia Sub-Committee, 2.30 p.m.
July 24.—I.G.E.—Joint Research Committee, 10.30 a.m.; General Research Committee, 2.30 p.m.
Sept. 1-4.—Second International Gas Conference, Zurich.
Sept. 6.—North British Association of Gas Managers.—Annual Meeting in Inverness.
Sept. 11.—I.G.E.—Finance Sub-Committee, 9.45 a.m.; Membership Sub-Committee, 10.30 a.m.; General Purposes Committee, 11.15 a.m.; Gas Education Executive Committee, 4 p.m.
Sept. 20.—I.G.E.—Refractory Materials Joint Sub-Committee (Stoke-on-Trent), 2.30 p.m.
Sept. 20.—Wales and Monmouthshire Association of Gas Engineers and Managers.—General Meeting at Porthcawl.
Sept. 24-26.—B.C.G.A.—Annual General Meeting and Conference at Sheffield.
Sept. 27.—I.G.E.—Liquor Effluents and Ammonia Sub-Committee, 2.30 p.m.
Sept. 28.—I.G.E.—Joint Research Committee, 10.30 a.m.; General Research Committee, 2.30 p.m.
Nov. 6 and 7.—I.G.E.—Autumn Research Meeting.

Sir Arthur Duckham Memorial Fund.

Official List of Donations from June 30 to July 6.

Name and Town.	Amount. £ s. d.
"Anonymous"	5 0 0
T. P. Ridley, Newcastle-upon-Tyne	2 2 0
Woodall-Duckham (Australasia) Proprietary, Ltd., Members of Staff	4 2 6
Yorkshire Junior Gas Association	3 3 0
Donations (4) paid above	£ 14 7 6
Donations (615) paid previously	10,334 11 8
Total Donations (619) paid	£10,348 19 2
Donations (3) promised	209 0 0
Total Donations (622) paid or promised ...	£10,557 19 2

Price Reduction at Fraserburgh.

Satisfactory Position Reported.

On the recommendation of the Gas Committee, the price of gas at Fraserburgh has been reduced by 2d. per 1,000 c.ft. to 4s. 3d.

At the last meeting of the Council, Provost Walker, who presided, said that when the new gas-works were started gas was selling at 6s. 8d. per 1,000 c.ft. The new price of 4s. 3d. showed a reduction of 35% to the consumer after providing for all necessary debt charges and the remaining debt of £16,000 on the Undertaking.

The gas-works, he observed, was the largest local ratepayer, paying £1,935 in rates, equal to 5½d. in the £ on £22,000. All the coals were now brought by sea, giving the harbour revenue £190, besides paying labourers £245 and carters £250, a total of £700. The Undertaking was now in a better structural and financial condition than at any time since it was taken over by the Town Council. The Undertaking was an increasingly valuable asset to the town, and Mr. Farquhar, the Manager, and his staff deserved congratulations on the good work they were doing.

100 Years of Gas at Houghton-le-Spring.

Centenary Celebrations.

"The people of Houghton-le-Spring must have been very enterprising and energetic to have started a gas-works so very early in the history of gas-making," observed Mr. Henry Woodall, Acting-Chairman of Directors of Houghton-le-Spring Gas Company, presiding at a luncheon on July 4 to celebrate the centenary of the Company.

"Unfortunately," continued Mr. Woodall, "very few records are available of the early days of the Company, but in a history of Durham there was a small note which said that the gas-works were established by a private company in 1833. It was not till 1909 that I became acquainted with the Company, when it was purchased from the proprietors of the old Houghton Brewery. The Secretary of the Brewery told me that as far as he could recollect the Company was originally owned privately by two doctors and one or two other gentlemen."

In 1929 the Company purchased the Hetton gas-works, said Mr. Woodall, and since 1910 the growth of the Company has been rapid. In 1910 there were only 450 consumers, while now they had 5,811 and the sale of gas had increased in the same time from 10¾ million c.ft. per annum to 61 million c.ft. per annum. For a number of years the shareholders received a very small return, and in some years none at all, but of late years they had been able to pay a regular dividend.

Practical Commemoration.

Mr. Woodall paid tribute to the services of Mr. C. Dru Drury, of Sunderland, Consulting Engineer; Mr. G. W. Martin, Engineer and Manager; and Mr. G. W. Wynn, local Secretary; and also the staff and workmen. He announced that to commemorate the centenary the Directors proposed to inaugurate a superannuation scheme, which they felt confident would appeal to the staff and the workmen. They were also giving all the men a week's wages.

Mr. F. P. Tarratt, of Newcastle, proposed the toast of "The Houghton Gas Company," and Mr. Woodall replied, after which Mr. Woodall submitted "The Visitors," and Mr. S. Spears, Chairman of Newbottle Parish Council, and Mr. J. Henry, Chairman of Morton Grange Parish Council, replied.

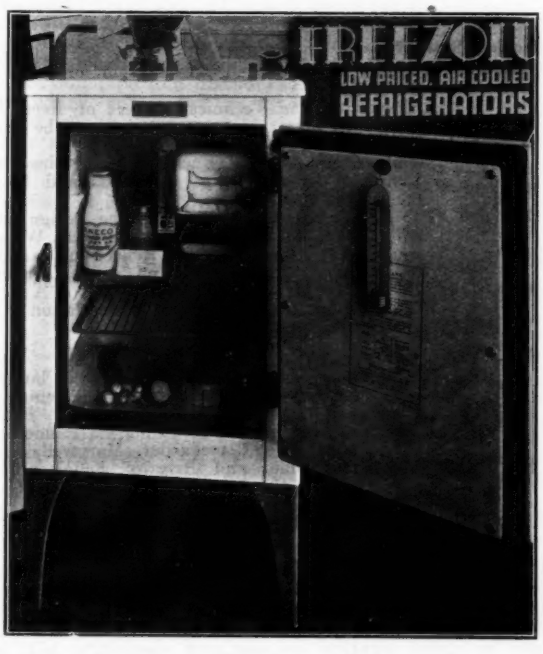
Mr. Martin presented to the Directors through Mr. Woodall a framed photograph of the staff as a gift from the employees, and afterwards the guests inspected the gas-works.

Carnival Display at Aldershot

THERM HOUSE
WORK FOR ME
ANCIENT AND MODERN
HOW MR. THERMS GET INTO GAS
A THERM'S A THERM — FOR A' THAT
THAT'S MR. THERM — THIS WAS
CG 5091

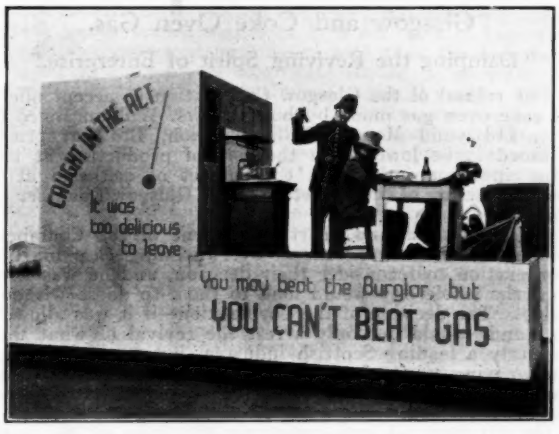
The Mid Southern Utility Company (formerly the Aldershot Gas, Water, and District Lighting Company) who introduced the " Bath for Two Coppers " tableau in their Carnival van for 1930—and which idea has been used in many other parts of the country since—developed a new piece of humour, as our photographs show, in connection with a similar event this year. The two sides of their van were devoted to a more or less orthodox display of the latest apparatus in colour and chromium plate and a tableau illustrating ancient *v.* modern in cooking, while the rear of the van was given over to an illustration of " How Mr. Therms get into Gas." This depicted Therms climbing a ladder, passing along a platform and down a chute into a funnel and thence into a gas meter. A pipe then led to a gas fire, the radiants and brick of which were painted " therm red." A section of the pipe was split open and crepe paper inserted suggesting the therm passing through. The large meter (" Therm House ") was constructed of wood and cardboard, and the whole production was the work of the Sales Manager, Assistant Sales Manager, and Joint Outdoor Managers. The van was sent on a tour round the Company's area the following day.

How Torquay Shows Refrigerators.



We are indebted to Mr. C. A. Pelley, Commercial Manager of the Torquay and Paignton Gas Company, for the accompanying photograph and particulars of his Company's method of displaying refrigerators in action. Mr. Pelley was prompted to write on the subject upon reading Mr. Easten Lee's observation in the June issue of the " GAS SALESMAN " to the effect that refrigerators if shown in use must have their doors closed. The method adopted by the Torquay Company very simply and ingeniously overcomes this difficulty. All that is necessary is to fit a glass panel in the door opening, while the temperature difference indicated on the two thermometers—the one hanging up inside the refrigerator and the other outside—tells the story most convincingly.

A Prize-Winner from Southampton.



The above photograph shows one of the entries of the Southampton Gaslight Company in a recent local Carnival which was successful in winning a prize.

Topical Publicity.

The B.C.G.A. has published two booklets dealing with topical subjects. The first, "The Manufacture of Ice Cream," describes the making and freezing of ice-cream, and the many processes in which gas plays a part—boiling and pasteurizing, providing cold storage, sterilizing, and so on. Gas is largely used too by the makers of wafers and other biscuits required by the ice-cream trade. The latest gas-fired automatic wafer-making machines can turn out about 175,000 wafers a day.

The other informative booklet, "How to Heat your Greenhouse," is for the amateur gardener who wants to get the best out of his greenhouse by including some method of artificial heating, which he is advised to put in during the warm weather, when alterations can be carried out without harm to existing plants. Since the publication includes a number of tables, readers can find out for themselves the approximate amount of heat required in their glasshouses. A chapter on tank heating for small aquariums is also included.

These new issues of "1,001 Uses for Gas" can be obtained post-free on application to the British Commercial Gas Association, 28, Grosvenor Gardens, S.W. 1.

Don't wait for hot water
Let hot water wait for you!
Take the GAS WAY TO HOT WATER
K.C.U
Full Particulars from the GAS SHOWROOMS

A special push for water heating was organized during the month of June by the Birmingham Corporation Gas Department in co-operation with Messrs. John Wright, Ltd. Our photograph is of a bright display in this connection in the foyer of the "Birmingham Dispatch" Offices.

Glasgow and Coke Oven Gas.

"Damping the Reviving Spirit of Enterprise."

The refusal of the Glasgow Corporation to accept offers of coke oven gas made by both Messrs. William Baird & Co., Ltd., and Messrs. William Dixon, Ltd., at prices claimed to be lower than the cost of production at the Municipal gas-works, was the subject of criticism at a recent meeting of the Directors of the Glasgow Chamber of Commerce.

Sir Steven Bilsland, Bart., President of the Chamber, submitted that there was an overwhelming case for the Corporation to reconsider their decision, and he was sure that the whole city would look to them to do so without delay. The decision of the Corporation—if it was allowed to stand—would not only arrest the revival of what was formerly a leading Scottish industry, but it would damp the reviving spirit of enterprise and initiative, on the encouragement and growth of which their industrial recovery largely depended.

He felt that he was expressing the view of the vast majority in all sections of the community when he appealed to the sections to co-operate and decide the best means by which this error could be repaired. A large saving in the cost of manufacture must be made if they were to get the business back. The most important method of achieving large savings was by building modern coke ovens with blast furnaces, and under this system a large volume of coke oven gas was produced; and success depended on the securing of a market for the gas at a reasonable price. This market was the biggest step towards the re-employment of workers.

Annual Meeting of Public Lighting Engineers.

Provisional Programme.

The Eleventh Annual Meeting and Conference of this Association will be held in Aberdeen during Sept. 17-20, 1934, when the following provisional programme has been arranged:

Monday, Sept. 17.

4.30 p.m. Council Meeting at the Caledonian Hotel.

7.45 p.m. Reception at the Art Gallery by the Lord Provost, Magistrates, and Council of Aberdeen. Musical Programme and Light Refreshments. (Evening Dress.)

Tuesday, Sept. 18.

10 a.m. Official Welcome and Opening of the Conference at the Music Hall Buildings.
Induction of New President.
Delivery of Presidential Address by Mr. Alexander Forbes.
Paper on Lighting Department Practice and Equipment will be presented by Mr. J. M. Ward and Mr. J. Mann.

1 p.m. Luncheon. (Members will make their own arrangements.)

2.30 p.m. There will be an address by Mr. J. S. Dow reviewing the display at the Indoor Exhibition, followed by a demonstration illustrating Street Lighting Calculations by Mr. W. J. Davey; after which the Exhibition will be formally opened for the inspection by Members and Delegates.
(In the course of the afternoon an excursion around the city and suburbs of Aberdeen, for the benefit of ladies and those not participating in the meetings, will be arranged.)

7.45 p.m. The Association Supper and Dance will take place in the Beach Dance Hall, Sea Beach Esplanade. (Evening Dress.)

Wednesday, Sept. 19.

10 a.m. ANNUAL MEETING and Transaction of Formal Business.
A Paper on the Technical Aspect of Recently Developed Street Lighting Fittings will be read by Dr. S. English.

1 p.m. Members and Delegates will be entertained at Luncheon by the Corporation Gas and Electricity Departments.

2.30 p.m. Papers will be presented on (*a*) The Design and Application of Traffic Signs by Mr. C. H. Woodward. (*b*) Road Surface Reflection Characteristics and their Influence on Street Lighting Practice by Mr. J. M. Waldram, and (*c*) A New Lighting-up Table based on Illumination Requirements by Mr. G. H. Wilson.

Thursday, Sept. 20.

No Conference business will be arranged, but an excursion by Motor Coach through the beautiful scenery to Banchory, Aboyne, Ballater, Braemar, and Linn o' Dee, returning via Pannanich Wells, Glentanar, Corsedarder, Marywell, Finzean, Feughside, and Brig o' Feugh. The Motor Saloon Coaches will leave the Art Gallery at 9.30 a.m. and will return at 6 p.m., which will afford ample time to catch the London Mail Trains.

It is anticipated that this forthcoming Conference will prove to be a most important and successful one. Full details of the public lighting of Aberdeen will be presented, and an Exhibition illustrating the most recent developments in street lighting by gas and electricity will be arranged. The Exhibition will be open to the public during the periods 10 a.m.-12.30 p.m. and 2.30 p.m.-5 p.m. on Sept. 19, and members and delegates will have an opportunity during that evening of inspecting the city lighting and special exhibits of the latest types of gas and electric lighting, which will be installed in the principal thoroughfares of Aberdeen, and also floodlighting, by electricity and gas, of a few prominent buildings and spires.

Previous Conferences have invariably received the support of Chairmen of Lighting Committees and others interested in an official capacity in street lighting. During recent years the number present at these Conferences has continually increased, and at the forthcoming Aberdeen Conference, to which ladies are officially invited, a big attendance is expected. The fee for one or more delegates

attending from a Local Authority is two guineas. Further information may be obtained from the Hon. Secretary of the Association (Mr. J. S. Dow, 32, Victoria Street, London, S.W. 1).

Gas Tar and Sewage Grease for Road-Making.

The two committees of Bradford Corporation responsible for different phases of road-making have been invited by the county's Sewage Department to lay down an experimental stretch of road with the comparatively new binding material known as "bitural," to be made in this instance from Bradford Gas Department tar and Bradford Sewage Department grease. Bitural, which is aimed to displace imported bitumen, was first introduced by Mr. C. F. Broadhead, the Melbourne (Australia) Gas Engineer, who originally used formaldehyde and ammonia but latterly has been making considerable use of sewage grease from which the lighter oils have been driven off, thus converting the tar acids into a synthetic resin which holds road material rigidly and is claimed to be absolutely non-skid.

Last year a million gallons of bitural were used on Australian roads, and the Bradford Sewage Department has already exported 190 tons of its grease to Australia for that purpose. The Bradford grease contains a considerable proportion of wool fats. An experimental road length laid down with bitural in October, 1932, at Darley, in Nidderdale, by the West Riding County Surveyor has lately been inspected by representatives of the Bradford road-making authorities as an example of the value of this material, and the surface was found to be in excellent condition.

Handling Coke by Suction.

Inauguration of New Plant at York.

On the occasion of the official opening of the pneumatic coal-handling plant by the York Gas Company, members of the York Corporation, the Ouse and Foss Navigation Committee, and representatives of interested trades were present on July 5 to see the Lord Mayor (Councillor H. E. Harrowell) start the working of the plant.

The plant conveys coal from a barge on the river at a normal rate of 20 tons an hour by means of a suction pipe. The suction plant is operated by a 50-H.P. pump. From the barge in the Foss, the coal is transferred through a 5-in. suction pipe and discharged into coal wagons on the rails, which run into the Gas-Works yard, and then emptied into the coal warehouse.

After passing through the pump the steam is utilized for process working in the Gas-Works. The coal is carried approximately 120 ft. by the suction plant, which has been designed and erected by Messrs. H. J. H. King & Co., of Knailsworth, Glos., and provision is made for future extensions.

The plant only needs one man to attend to the feeding in the barge, and one at the truck to supervise the discharging.

Luncheon.

Mr. C. B. Johnson, Chairman of the York Gas Company, presided at the luncheon at the Royal Station Hotel, which followed the tour of inspection.

The plant, he said, would be not only an advantage to the Gas Company but to the other users of the river, and, through the energies of the Ouse Navigation and their modest charges, would result in a considerable tonnage of coal coming from the collieries to the works.

The Lord Mayor, responding for the guests, said the inauguration of the new plant would contribute very largely to a restoration of the trade that had been lost by the Ouse Navigation in recent years. They had witnessed no more amazing transformation in any undertaking than that of the Gas Company, and he congratulated the Directors and Engineer on the success of their enterprise from a business standpoint.

Alderman C. W. Shipley (Chairman of the York Corporation Electricity Committee) proposed "Continued Success to the York Gas Company." He said that while they were in competition with each other, there had always been the most friendly relations between the two bodies. As one who had visited many gas-works in the country, he could say he had not yet seen one that could compare with the York Gas-Works. Every credit was due to Mr. Bloor and those associated with him.

Mr. H. E. Bloor (Engineer, Manager, and Secretary to the York Gas Company), in reply, said that the new plant was a good business proposition, in that after providing a modest return to the shareholders, any surplus would be utilized for reducing the price of gas.

Co-Partnership in the Gas Industry.

The Journal of the Industrial Co-Partnership Association for June, 1934, publishes a table of statistics relating to co-partnership and profit-sharing in British gas companies at the end of 1933. The table should prove of much interest to all concerned in the Gas Industry. It is noteworthy that the strength of co-partnership is being consolidated in the Industry, and we may expect within the next year or two that a number of co-partnership schemes in the Industry will be extensively increased. It is encouraging to note that the amount of shares and deposits held by employees has a market value of over four million pounds.

The number of employees under agreement for profit-sharing or co-partnership stands at 48,227. Among those employees, a total of £387,332 was divided, while the profit to employees since the adoption of the scheme amounts to over five million pounds.

Improving the Quality of Coke.

Two notable deductions from the work carried out by the Midland Coke Research Committee have been (1) that, contrary to commonly accepted opinion, a coke of higher shatter index is produced by top-charging a coal to the ovens than by introducing it as a compressed cake; and (2) that the presence of fusain in the coking slack, far from being deleterious, improves the quality of the coke.

A study of the effect of fusain during coking was begun in 1928, and the work which demonstrated that it is a desirable constituent of the charge has been described in the Technical Press ("Coke for Blast Furnaces," London, 1930; Proc. Third Internat. Conf. Bit. Coal, Pittsburgh, 1931). Sufficient fusain is not usually available to produce the optimum blends for the production of the hardest cokes. A search was therefore made for other substances which might act similarly to fusain, and it was found that, usually, finely ground low-temperature or high-temperature coke would serve.

At the instance of the Midland Coke Research Committee, Mr. R. A. Mott and Dr. R. V. Wheeler, in conjunction with the National Federation of Iron and Steel Manufacturers, took out a patent in 1930 for "Improvements in, and relating to, the manufacture of coke" (B.P. 351,546 of 1930), which embodied the addition to coking slacks of fusain or "fusain substitutes." This patent was abstracted in the "JOURNAL" for Aug. 26, 1931, p. 490. Free licences to use the process described were granted to all subscribers to the funds of the Midland, Northern, and Scottish Coke Research Committees. The process has been widely adopted, and the Midland Coke Research Committee have now decided to render it freely available to all who wish to use it.

Semi-Hot and Hot-Process Tarmacadam.

In the course of a paper, read before the Institute of Quarrying, Mr. W. E. Cone, Technical Adviser to the British Road Tar Association, stated that the advantages to be derived by laying the mixture in the heated state are principally concerned with the binder and the consolidation of the material. In the first place, it enables a tar of much higher viscosity to be used. Secondly, the mixture possesses a higher degree of plasticity at the time of rolling, which ensures the maximum amount of consolidation taking place. Hot-mix materials are eminently suitable for roads carrying heavy traffic, and since it is desirable to have a more dense compressed mixture to withstand the heavier loads, the grading of the aggregate should be controlled very carefully to obtain a medium amount of voids. The mixture should be designed in a manner to secure a properly balanced aggregate, incorporating a small percentage of mineral filler. The particle sizes of the aggregate, and percentage proportions, in which they should be present in the mixture, will largely be determined by the consolidated thickness to which it is laid. For this class of work, the tar should generally fall within the requirements of British Standard Specification for Tar No. 3, or a tar of even higher viscosity can be used. The temperature to which the binder and aggregate should be heated, will largely depend on the climatic conditions, and the distance the material has to be transported. It will be found in practice that a temperature between 220° F. and 260° F. for the aggregate and binder will generally meet the required conditions.

A large mileage of hot-mix tarmacadam has been laid under a variety of conditions with successful results. Its utilization offers a type of surfacing well suited for roads carrying heavy traffic, and there need be no hesitation on the part of any manufacturer to undertake this class of work.

Manchester Association at Buxton

Though Buxton already has a long and famous history, it is tireless in its efforts towards further achievements, under the leadership of a Corporation who appear well able to take the fullest advantage of the gifts which Nature has so lavishly bestowed upon the town and the surrounding country. We are told that the reputation of Buxton for the relief and cure of sufferers from rheumatic diseases goes far back to the days of the Romans, and with the passing of the years this fame has gone on increasing, under the sagacious administration of the authorities. Gifted though it be, Buxton caters for all classes. The efficacious water from its thermal springs, which issues from the ground at an unvarying temperature of 82° F., can be partaken of in luxury at St. Ann's Well, at a small charge; while at a pump nearby the same water is at the disposal of the passer-by, both free and freely. Then for those whose means do not permit them to make use of the magnificent bathing establishments under the control of the Corporation there is the beautifully situated Devonshire Royal Hospital, which is said to be by far the largest mineral water hospital in the country. Great work is done there by the use of Buxton water and baths for the poorer classes from all parts of Great Britain.

It was in Buxton, with all its splendour, emphasized by brilliant sunshine, that, on the invitation of their President, Mr. F. G. Shaw, nearly one hundred members of the Manchester District Association of Gas Engineers assembled last Friday. Mr. Shaw is the Gas Engineer to the Buxton Corporation, by whom he was supported throughout the visit in that cordial and appreciative manner which is so gratifying to observe. The importance of the great Gas Industry, as represented by Mr. Shaw, and the excellence of Mr. Shaw's work in that Industry, are recognized to the full by the Buxton Corporation. By the courtesy of the hosts, opportunity was afforded early arrivals of seeing the Pavilion Gardens before the first item on the day's programme, which was a visit to the gas-works.

A Holder Inauguration.

As was stated by him in his Presidential Address to the Manchester Association [" GAS JOURNAL," March 28, 1934, pp. 815-821], Mr. Shaw is a believer in ample storage capacity, and to take care of present and prospective demands he has replaced a two-lift spiral-guided holder with a new three-lift one on the same principle, and having a capacity of 500,000 c.ft. For this he utilized the existing steel tank (originally designed for a three-lift holder), which has been adequately strengthened to meet the fresh requirements. When the visitors arrived, they found this new holder all spick-and-span, freshly painted in a restful green colour, to harmonize with its countrified surroundings; and a brief inauguration ceremony was performed by His Worship the Mayor, Councillor J. H. Smythe, who entered the valve house and turned on the gas. It happened to be the Mayor's birthday, and he was clearly spending it in a congenial manner.

A hearty welcome was extended to the Association by Councillor Wall, the Chairman of the Gas Committee, whose period of public service (extending over forty years) is now drawing to a close. In his remarks, Mr. Wall emphasized the fact that this new holder will in all probability form part of a scheme for the reconstruction of the whole of the gas-works. Before long he hopes it may be possible for the members to re-visit the town and see what Mr. Shaw will have done with the works. The next portion to be taken in hand will be the carbonizing plant. Here is the tribute paid to the President by his Chairman: " Thanks to the careful management exercised by Mr. Shaw, the gas undertaking is in a sound financial position, selling gas at a reasonable price, and giving excellent results. Mr. Shaw stands high in the estimation of the Council. In their opinion they could not have a better or more loyal engineer to look after the interests of the undertaking. With this holder Mr. Shaw and the Contractors have made an excellent job."

A feature of the ceremony was the presentation of silver salvers suitably inscribed to the Mayor and Mr. Wall, by Mr. W. H. Handley, Managing Director of Messrs. R. Dempster & Sons, Ltd., Elland (who carried out the work on the holder).

There followed a brief inspection of the gas-works, which were found to be a model of order and cleanliness, such as to match the appearance of the town itself. The Local Authority have owned the undertaking for more than sixty years, and in 1879 the works were removed to the present site. They are unusual in having the plant, with the exception of the holders and the valve and governor house, in one extended building. At present the retorts are all hand-stoked, but it is anticipated that, under the new scheme, these retorts will be replaced by either a vertical installation or machine worked horizontals. Steps are taken to ensure accurate control of the working, by means of Arca regulators, a Cambridge optical pyrometer, and a Sigma recording calorimeter. The valve and governor house (which was recently extended) has a steel-grating floor, over a basement where the whole of the valves and connections lie in sight, and within easy reach.

Buxton's Street Lighting.

The principal roads in Buxton are lighted by Sugg " Littleton " lamps, 5-light No. 2 mantles, with larger units up to 12-light size at important junctions, where in addition directional reflectors are fitted. The standard lighting for ordinary roads is by 16 in. and 14 in. square lanterns (Foster & Pullen's make) with two No. 1 or two No. 2 mantles, fitted with Sugg " Multi-Ray " directional reflectors. The lamps are spaced alternately on each side of the road, the distance from centre to centre of the lamps being 50 yards in most cases. The larger proportion of the gas street lamps is Gunning clock controlled.

The total number of gas street lamps is 645. Gas is charged at 7½d. per therm on an estimated consumption, subject to special discount. Lighting and extinguishing, cleaning, adjusting, painting, and maintenance are charged at cost.

The columns are aluminium painted. The aluminium powder is mixed with the medium just before painting the lamps, and the effect is always improved if the lamp and pillars have been thoroughly well washed down some time previously, and the paint applied during the warmer periods of the day.

Guests of the Corporation.

By invitation of the Mayor and Corporation of Buxton, the visitors, together with many councillors, officials, and other prominent townspeople, to a total number of about 150, sat down to luncheon in the Palace Hotel, when the Mayor, who presided, said the townspeople were proud of the fact that Mr. Shaw had been elected President of the Manchester District Association. When Mr. Shaw first arrived in Buxton, he found that money had been sometimes spent in a manner not altogether wise, but with the help of his practical knowledge he had pulled round the undertaking in a way which had given the greatest satisfaction to everyone. Mr. Shaw, replying to the toast of the Association (which the Mayor had proposed), expressed his gratitude for the manner in which he had been supported by his Borough Council. He also voiced his pleasure at the presence of Mr. C. Valon Bennett, the President of the Institution of Gas Engineers. In conclusion, he thanked his Chief Assistant, Mr. H. H. Knowles, and the other members of his staff, for all they had done towards making the day a success.

The Senior Vice-President of the Manchester Association, Mr. A. L. Jennings, proposing " The Borough of Buxton," said the visitors deeply appreciated their warm welcome and the splendid hospitality extended to them by the Corporation. The toast was briefly acknowledged by Councillor A. J. Potter, the Vice-Chairman of the Gas Committee, who remarked that they hoped one day to have the pleasure of seeing the Association again in Buxton.

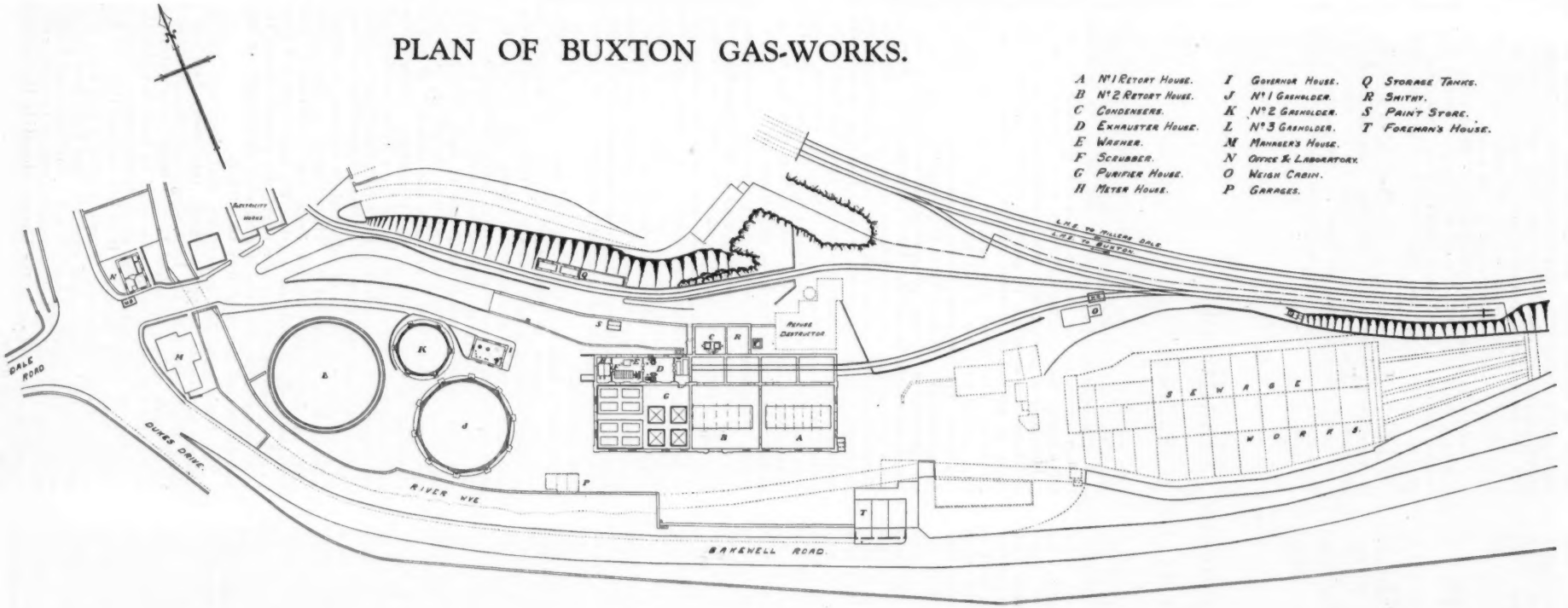
Mr. Valon Bennett was called upon, and told those present that the Institution of Gas Engineers fully appreciated the value, not only to the Institution but to the Industry at large, of the Manchester District Association. This, he said, was the first occasion on which he had been able to attend a District Association meeting since he took office, and it would long remain in his memory.

Derbyshire Silica Firebrick Company.

Luncheon concluded, and the ordeal of the official photograph having been successfully tackled, members left by private cars and motor coaches for a drive of 11 miles to the Friden works of the Derbyshire Silica Firebrick Company, Ltd., where an interesting time was spent, and where tea was served prior to the return to the Gas Service Buildings in Buxton.

A hearty vote of thanks was proposed by Mr. A. L. Holton, of Manchester, to Mr. Frank West, Managing Director, together with the other Directors and Staff of the

PLAN OF BUXTON GAS-WORKS.



Company for the arrangements they had made and the interesting and instructive time provided for them in the tour of the works. Mr. Holton referred to the great care taken in all the departments preparing, mixing, and burning the materials, and also referred to the research and microscopic control of the laboratory.

Having seen the care and attention devoted by the firm to the preparation of their refractory materials, one is given cause to wonder whether trouble in a retort setting may not be due to the working of the setting rather than to the failure of the refractory material to which it is generally attributed.

Mr. Frank West, in responding to the vote of thanks, mentioned that it was thirteen years since the Association last visited the works. He stated that he was particularly pleased to welcome the Association on this occasion when Mr. Shaw, the neighbouring Gas Engineer, occupied the position of President. He drew their attention to the large extensions and improvements made since their last visit, and then gave a description of the prehistoric surroundings, mentioning the famous Druid Circle of Arbor Low, also Gib Hill. He referred to the flint tools and instruments which are found during the working of the silica deposits, the origin of which deposits appears to be unknown at the present time.

The Friden Works.

The Derbyshire Silica Firebrick Company, Ltd., was established in 1892 to manufacture highly refractory materials for high temperatures in combustion chambers, furnaces, &c., from silica deposits in the surrounding districts, containing 89 to 98% silica.

The output of the works is about 700 tons of finished goods per week. There are extensive railway sidings, and two sides of the works have connections with the old High Peak Railway of the London, Midland, and Scottish Railway Company.

The works are well equipped with suitable up-to-date machinery for their class of work, enabling a satisfactory product to be made; they are also fitted up with modern laboratories, where research work is constantly carried out, assisting materially in the production of refractory materials. The lay-out of the works from its inception is such that the raw materials are taken in at one end, and the first of the various processes of manufacture start and go on progressively through the sheds and the kilns into railway trucks in the siding at the other end of the works, thus avoiding any unnecessary handling of the materials.

The raw siliceous materials are found in large basin-shaped deposits in the limestone and consist of white and grey argillaceous sands and also some white and black marls. The silica rock is found below the coal seams. At the present time the Company works seven different deposits, the nearest being a quarter of a mile from the works and the farthest 16 miles. The raw material is carefully separated at the pits, loaded into double-sided tipping wagons running on narrow-gauge railway, and is then transported to the works from the local pits by petrol locomotives and from the distant deposits by road motor lorries.

The raw siliceous materials are dried on hollow floors, which are heated by waste steam from the steam engines, mixed and ground to a fine state and then soaked in ageing bins or silos for a definite period before being pugged and pressed into the various shapes required or made up by the semi-dry process, after which they are dried on floors heated by waste steam or in the tunnel drier heated by hot air from the kilns.

The bricks are burnt in continuous kilns to a suitable

temperature according to requirements, but exceeding that to which they will be subjected under working conditions, the highest temperature being 1,530° C. They are soaked at this higher temperature for definite periods, according to the class of goods. It is interesting to note that, in the burning of the goods by the continuous kilns, they are under fire on an average for six and a half days, part of this being from the waste heat from the previous kiln, and require about 10 to 11 days for cooling.

An interesting feature in the works is the manufacture of insulating bricks and blocks. The plant required for this purpose is a separate and distinct unit. The material is carefully mixed and graded, then moulded into shapes, dried in a tunnel drier, and burnt very slowly to a suitable temperature in specially designed intermittent kilns so as to produce the maximum insulating property.

Another interesting feature in the works is the manufacture of bricks which are particularly suitable for the combustion chambers of water tube boilers, re-heating and soaking furnaces. At the far end of the works, and alongside the insulating department is a complete unit for the manufacture of the company's "Peaksil" bricks, which contain 95% silica. This plant is laid out on similar lines to those pertaining in the other parts of the works. There is also a small amount of hand moulding of special shaped blocks, particularly of such materials as sillimanite, &c., used in glass works and some of the electrical and oil furnaces.

The firm's war memorial is of interest in so much that it is made from the refractory materials manufactured by the Company. It was made and designed by the staff and workpeople themselves, everyone in the works taking a hand in the manufacture, and was unveiled by the Duke of Devonshire.

Gas Engineers' Handbook*

Reviewed by Dr. G. E. Foxwell

It is a peculiarity of "Handbooks," by whatever name they are known, that they must reflect the needs of the compiler more than the needs of the user. In subsequent editions this characteristic becomes less marked as users send to the editor their comments and complaints. To compile a good record of the formulæ, tables, and what not that are needed in any industry is extremely difficult and with the constant extension of knowledge is apt to become increasingly so. For one editor to undertake the task is probably not only to invite disaster but to ensure it, if only because the needs and knowledge of the individual must be limited. It was a happy thought of the American Gas Industry to compile for themselves a volume of this nature, a vade-mecum of all that appears useful to them, in collaboration. The method adopted appears to ensure that the information therein provided shall be representative of American gas practice. Commenced in 1920 and published as a few sheets in 1922, the handbook was actively started in something approaching its present form in the year 1927, when a special committee known as the "Gas Engineers' Handbook Committee" was formed by the Pacific Coast Gas Association. This committee was able to enlist the active support of individuals and companies and appears not to have been starved by lack of funds. When the local Association had finished its preliminary compilation, the book was passed on to a committee appointed by the American Gas Association to review its contents; much additional material was added at the suggestion of this expert committee.

The American Gas Association, while not guaranteeing the correctness of all the contents, recommend the book thus checked by themselves to gas engineers. Since, therefore, it may be assumed that the Gas Engineers' Handbook is representative of American practice, the reader will turn over the pages to discover on what facts and formulæ American practice is based. Not unnaturally, it is found that American authorities bulk largely; but to the credit of the American gas engineers it must be noted that British and other papers have been included to a marked degree.

The line of demarcation between a handbook and a text-book is not easy to define. There are some methods of presentation and some branches of knowledge which can be unhesitatingly assigned to one or the other, but no hard-and-fast rule is possible. The authors of the book under review have solved the problem in a manner entirely satisfactory. There are pages of tables and of formulæ without much explanation and needing none; there are pages that but for brevity of wording might be taken from a text-book, but the lucidity of explanations belongs to the handbook. At random one observes among these the note on recent work upon steam tables (p. 140), the discussion of reaction velocity and combustion charts (pp. 174-189), the "pocket treatise" on producer gas and blue water gas (pp. 246-297), the disquisition on the theoretical aspects of coal carbonization (pp. 380-411); pages 490-723 contain such a veritable treatise on gas analysis as to show that chemistry occupies a higher place in gas engineering in America than it does here—truth to tell, British gas engineering could do with a little more chemistry! There is a useful account covering 25 pages on pipe corrosion—indeed we could continue quoting pages which savour almost of the text-book but resemble rather an advanced student's notes from a text-book.

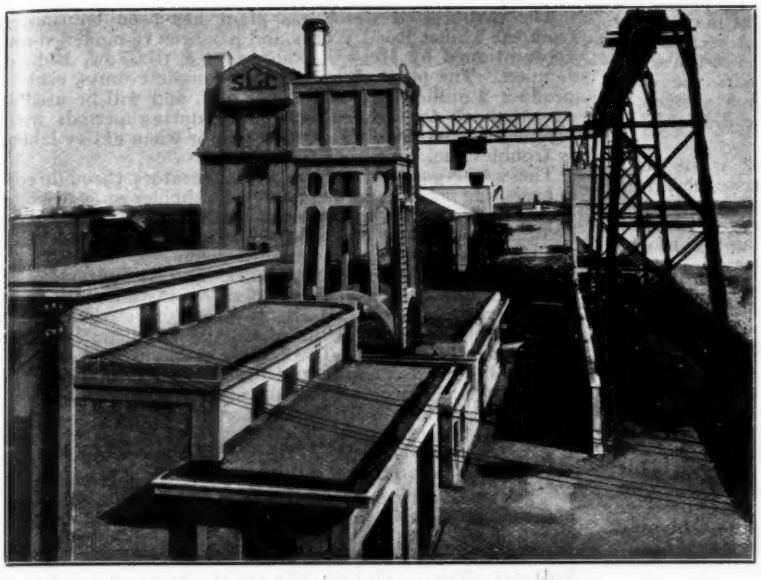
So much is there to praise in this book that one must recall that there are essential differences between British and American conditions which are bound to lead some British engineers to be disappointed if praise be indiscriminate. The expense of producing so large a book, and particularly of producing a book containing so many tables which expend an undue proportion of the typesetters' time, make it necessary to issue the same volume here as in America. The result is a certain number of pages (not very many) that are of but little value to the British gas engineer. The information on gas-making coals refers to American coals exclusively; it is perhaps also arguable that the tabulation of the properties of carburetting oils of American origin should not have prevented the addition of some information about oils from other parts of the world. Naturally the extent to which C.W.G. is made in America has caused that section to overshadow the carbonization section. It is a reasonable criticism from the British viewpoint that carbonization is rather scantily covered, though it is but just to say also that the treatment is far from conventional and comprises information that has not previously appeared in works of this character.

The prominence given to coke ovens may seem strange, but coke ovens are, of course, used in American gas-works to a much larger extent than here; the still increasing use of coke oven gas in England does not make this information unwelcome, particularly as there is no good coke oven handbook. The sections on oil gas and on re-forming natural gas will be of small interest to us, since these are problems which do not worry the British gas engineer. The section on industrial applications leads one to believe that we are well in advance of our overseas colleagues in this direction.

Although, however, there may be minor points in which criticism cannot be altogether stilled, our general impression is one of immense vitality. Here is no perfunctory collection of tables and ready reckoners such as might have been taught us in our student days many decades ago. On the contrary, work is included so recent as to be almost untested under practical conditions of daily working. Information of this character, however, has clearly been very carefullv selected and represents the material of gas engineering of the present or the immediate future. That certain of this information should have been inserted with the sanction of the leaders of the gas engineering profession of America indicates that our colleagues are alive and eager to use every new piece of information as soon as research workers have discovered it. Theory seems to play a larger part in American practice than does experience, upon which we rely almost too much. We sometimes are prone to take a bad experience of a particular plant to mean that it is unworkable, whereas it may only mean that we have not discovered the right way to work it.

The book gives the impression that American gas engineers are ready to probe deeply into every function of their plant. Opening the book almost at random one finds an example of how to calculate "at what temperature the walls of a flat retort 10 in. wide must be kept in order that a charge of coal initially at room temperatures should be coked after eight hours." It is but seldom that we here attempt to calculate such things; we try it and see. Both are important, theory and practice, and both here run together. This excellent book is not a duplication of English works on the subject but is complementary to them and it is well worth a place in the library alongside the publications we use daily.

* "Gas Engineers' Handbook," prepared by the Gas Engineers' Handbook Committee of the Pacific Coast Gas Association. McGraw-Hill Book Company; 1,017 pp. Price, 42s. net.



NEW WORKS AT SHANGHAI

Four Millions a Day Plant Put into Operation

The New Shanghai Works, showing Boiler House in foreground with Woodall-Duckham Retort House Behind.

The erection and putting into operation of a complete gas-works, capable of turning out 4 million c.ft. per diem, all in the space of 14½ months, is the achievement of the Shanghai Gas Company, whose new plant was started up on Feb. 8 last.

As a souvenir of the official inspection of the new works a very attractive brochure was published by the Company, from which the following extracts have been made:

Early History.

On Feb. 26, 1862, the *North China Daily News* published the prospectus of a proposed gas company to operate in the European settlement in Shanghai, with a capital of Taels 100,000.00 in shares of Taels 100.00. The works were to be constructed for the lighting of 10 miles of streets with 500 street lamps, 100 homes with 20 lights per house, and 1,500 miscellaneous lights.

During December, 1863, land situated on Soochow and Defense Creek was purchased, and within a few months tenders were invited for the erection of the works, gas eventually being available for lighting purposes on Nov. 1, 1865, 69 years ago. The price charged at that time was $4.50 per 1,000 c.ft.; the number of consumers was 58; and the total length of gas main was 5 miles.

The price of gas at the present time is Shanghai $2.85 per 1,000 c.ft.; the number of consumers 13,384; and the length of gas mains 194 miles.

During 1930 the quantity of gas made was 722,408,500 c.ft.; the number of consumers 11,795; and the length of gas mains 165·53 miles; and it was realized that the plant existing at that time was inefficient and approaching the end of a useful life, the greater proportion of it having been installed about 1900. In addition, the yearly consumption of gas had increased rapidly and steadily since 1926, and further gas manufacturing plant was essential.

It was found that to install new modern plant on the existing site, while maintaining the supply of gas to the city, would be an extremely expensive proposition, due to the position of the available vacant area of land on the site; so, during 1931, schemes were prepared for the erection of a new plant to produce 4 million c.ft. of gas per diem, to embody all the most modern improvements in gas manufacture and purification, and designed to allow for extensions to produce 10 million c.ft. per diem.

A suitable site, measuring approximately 160 ft. wide by 1,425 ft. long was purchased in August, 1931, and the construction of wharf and erection of boundary walls was soon commenced, and the site drained and filled. During February and March, 1932, the Sino-Japanese hostilities upset arrangements and delayed all work for two months. The foundations for the retort house and gasholder were constructed during the summer of 1932 and the erection of the first portion of the plant was commenced on Nov. 20 of that year.

The complete installation was ready for gas making on Feb. 6, 1934, the whole works thus taking 14½ months to construct. The plant was put into operation and gas made on Feb. 8, 1934, the old Thibet Road plant being shut down on March 13 and demolition commenced.

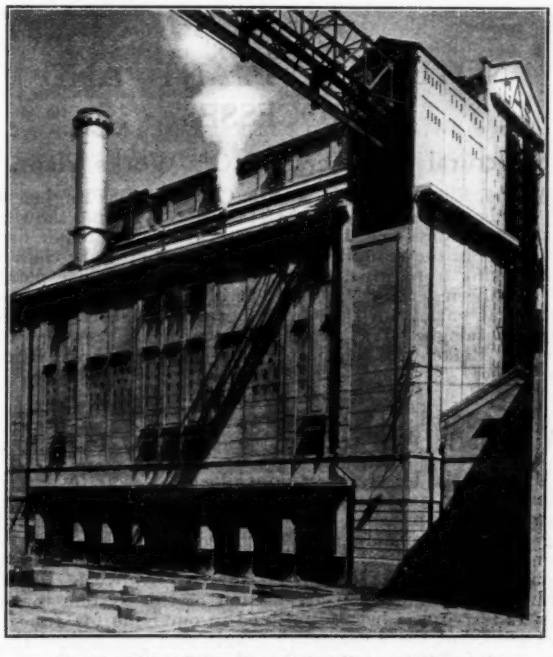
Description of Plant.

Coal is unloaded from 200-ton lighters by a 6-ton "Clarke Chapman" steam-driven crane and fed through a hopper into an "Avery" automatic weighing machine where the weight of coal passing through the machine is recorded. The coal then passes on to a system of 24-in. inclined band conveyors, which carry it into the coal store via a 24-in. shuttle band conveyor and a 24-in. travelling band conveyor bridging the width of the store. The coal store is a reinforced concrete structure, 220 ft. long by 48 ft. wide having a capacity of 5,500 tons.

Coal is transported from the store on a system of underground band conveyors, through a breaking machine and "Avery" automatic weighing machine on to a lip bucket conveyor which discharges into hoppers above the retorts.

Carbonizing Plant.

This plant was supplied by the Woodall-Duckham Vertical Retort and Oven Construction Company, and con-



The New Woodall-Duckham Retort House at Shanghai.

sists of one bench of thirty 80-in. major-axis upwardly heated continuous vertical retorts capable of producing 4 million c.ft. of gas per day. The retorts are maintained at a temperature of 1,300° C. at their hottest section and discharge the coke into skips transported by a 3-ton overhead travelling telpher system which deposits the coke either into a yard storage area or through a system of screens into storage hoppers where it can be delivered to vehicles or baskets.

Inside the retort house are two tubular waste heat boilers, each large enough to receive all the waste-heat from the bench of 30 retorts and capable of producing 14,500 lbs. of steam per hour at 120 lbs. per sq. in. pressure, which is sufficient to maintain an adequate steam supply to the whole works.

A special feature of the carbonizing plant is the large capacity of the external producers which have been designed to utilize coke breeze as a fuel, thereby releasing the maximum quantity of coke available for sale.

Purification.

The gas passes through two units of water tube condensers, supplied by Messrs. R. & J. Dempster, of Manchester, and thence to a 200,000 c.ft. per hour 3-blade exhauster, by Messrs. Bryan Donkin, of Chesterfield. Two streams, each of 2 million c.ft. per day, then proceed through Pelouze & Audouin tar extractors, Livesey washers and rotary washer-scrubbers for the removal of tar fog and ammonia.

Continuing in two separate streams the gas passes through two units of purifiers. Each unit consists of four cast-iron boxes with machined lip rubber jointed mild steel covers held down by swing bolts fitted with ring nuts. The boxes are supported on reinforced concrete structures with reinforced concrete revivifying floors above. One section has one tar and two liquor tanks underground providing a total capacity of 400,000 gallons. Each unit is arranged with a lifting block for raising oxide to the revivifying floor in suitable skips and with runway joists above the boxes to facilitate the removal of the steel covers.

Upon leaving the purifiers one stream of gas passes through a " Shunt " station meter, supplied by Messrs. George Kent, Ltd., after which it combines with the other stream and continues to a " Dri-Gas " plant, supplied by Messrs. W. C. Holmes & Co., Ltd., of Huddersfield, for the extraction of naphthalene and moisture, thence on through a " Holmes-Connersville " station meter fitted with a pressure, temperature, and time recorder.

From the outlet of the meter the gas passes into a 750,000 c.ft. spiral-guided gasholder in a steel tank, supplied and erected by Messrs. Samuel Cutler & Sons, of London.

The gas is transferred from the ¾ million c.ft. works holder to the main distributing holders on Thibet Road through 14-in. spun cast pipes, with Stanton-Wilson joints, supplied by Messrs. Stanton Ironworks Company, Ltd.

Carburetted Water Gas Plant.

The carburetted water gas plant has been transferred from the Thibet Road Works and has been re-modelled and reconditioned by Messrs. Humphreys & Glasgow, Ltd., of London. The plant comprises two complete units, each to produce 2 million c.ft. of gas per day, and will be used as an auxiliary to the coal gas plant during periods when supplies of coal are difficult to obtain or when native labour is troublesome.

The water gas passes from the generators through condensers and washers into a small relief holder of 50,000 c.ft. capacity, from where it connects up with the coal gas purification system and proceeds along with the coal gas into the main gasholder.

Boiler plant comprising two 30 ft. by 9 ft. and one 28 ft. by 7 ft. Lancashire boilers has been installed. These boilers are of suitable capacity to provide the whole works plant with steam should the production of steam from the waste-heat boilers fail. The boilers are housed in a building of reinforced concrete and brick construction, and the boiler setting is provided with a reinforced concrete chimney 125 ft. high by 5 ft. diameter.

Tar Treatment.

The treatment of coal tar to produce saiable commodities has received special attention and two 12-ton pot stills for the production of pitch or refined tar have been installed.

A continuous tar dehydration plant (supplied by the Thermal Industrial and Chemical Research Company (T.I.C.), one of the Associated Companies of the Woodall-Duckham Company) will distill 15 tons of tar per 24 hours, producing any desired quality of refined tar with its accompanying proportion of tar oils. These tar distilling plants are complete with steam dehydrators, overhead feed tanks, condensers, oil separators, and final storage tanks. Equipment is provided for the mixing of various tars for the production of road surfacing materials, paints, flooring, and roofing compounds, and the complete installation is arranged to enable tar to be easily handled and operated during the very coldest weather. The storage of crude tar is cared for by a steel tank of 600,000 gallons capacity to be transferred from the Thibet Road Works.

Sufficient ground area has been allotted for the future installation of plant to treat ammoniacal liquor to produce either sulphate of ammonia or anhydrous ammonia.

Workshops and Offices.

Suitable workshops have been erected consisting of fitters', blacksmiths', carpenters', electricians', and machine shops, while an attractive building fronting the Yangtszepoo Road comprises stores, engineers' offices, drawing office, and an up-to-date laboratory. Modern bath, dressing, and mess rooms have been provided for the European and Chinese staffs; and residences for the Assistant Engineer and the Works Superintendent have been arranged above the office and the workshop buildings.

NOTES ON PLANT AND PROCESSES

Structural Engineers for Gas-Works Plant.

Messrs. Firth Blakeley, Sons, & Co., Ltd., Gas Engineers, of Leeds, have issued an attractive catalogue showing many examples of their structural work. The firm specialize in the manufacture and erection of every class of gas-making apparatus, coke-oven and bye-product plant, tar distilleries, &c. Naturally, it is impossible to portray the great variety of their products within the compass of their catalogue, but what is shown convinces one of Messrs. Blakeley's abilities in the sphere of engineering generally.

Automatic Accounting for the Gas Industry.

Many of the large undertakings in the Gas Industry are appreciating, more and more, the advantages of the Powers-Samas punched card system of accounting, regarding which a brochure entitled " Accounting for Management Control " has been published by Messrs. Powers-Samas Accounting Machines, Ltd., of Aldwych House, Aldwych, W.C. 2. The application of this system to the Gas Industry was briefly outlined in our issue for June 14 last year, but there are many people who still believe that the use of Powers punched card accounting machines is confined principally to the production of statistics in connection with census returns. They do not appreciate that because the fundamental principle of the Powers system is the basis of all accounting procedure it has been possible to develop the machines for accounting work to such an extent that, to-day, they can claim to be the most highly developed form of mechanical accounting machine.

All accounting work, reduced to its simplest expression, resolves itself into the recording of original data, sorting and re-sorting such data into classified groups, and adding and subtracting selected groups of figures and tabulating the results.

Powers punched card accounting machines are, therefore, able to handle the accounting work of any organization in such a way that the complete and up-to-date statistics demanded by modern scientific management are produced as part of the accounting procedure and at no extra cost.

Every accounting movement, whatever it may be (purchase, sale, movement of stock, &c.), is registered on a standard sized card of simple design. One card per operation is used and contains the maximum number of details required concerning the operation affected. These details are indicated on the card, not in handwriting, but by means of perforations made by a punching machine. This, the first step, is the only manual operation of the system.

The booklet goes on to describe the Powers four punch, gang punch, automatic sorter printing tabulator, and a card cabinet, and concludes with some typical costing records produced on the Powers four tabulator.

The Investigation and Settlement of Coke Complaints*

The domestic consumer is the most difficult to satisfy if only by reason of the small appliances used and the necessity of the fuel being as foolproof as possible. Moreover, we find that consumers are becoming more critical as the use of coke boilers becomes more general, and even turn their attention to the appearance and colour of the delivery when it arrives. Grading and size also attract their notice. But when you consider the large amount supplied and the fact that the proportion of complaints received is only in the region of 0·5%, it is evident that some wonderful work has been done towards suiting their very particular requirements. The larger installations have generally an expert stoker in attendance, and their range and flexibility is usually sufficient to cover the varying characteristics in the different types of coke which we supply.

Another important point is that most of you have only one kind of coke to deal with, and although you may be unable to comply with a specialized demand for a certain type of coke, yet it makes your job much easier as far as complaints are concerned. Your customer knows that only one kind of coke is to be expected.

I propose to pass on to a few examples of complaints of the actual behaviour of the fuel during burning, giving as far as possible the cause and effect together with points to be observed in the examination of the installation, not forgetting the importance of extracting as much information as possible from the consumer.

Coke Goes Out Overnight.

The importance of a careful examination of the fuel cannot be over-emphasized, for from its general characteristics such factors as grading, moisture, hardness, density, and structure can be noted.

Average householders do not complain without cause. They are ready to accept advice and information, and usually both mistresses and maids understand the general regulation and running of the boiler. Therefore, in all cases the assumption that the consumer or installation is to blame is to be avoided until the possibility of the fuel being at fault has been eliminated.

If you are satisfied that the coke is a good delivery, and not the cause of the trouble, ascertain whether the coke goes out without burning or is burnt out before morning. In the former case, more damper opening or primary air admission is necessary where the boiler has been run completely closed; in the latter it is probably necessary to open the check damper still further to reduce the draught.

Examination of the installation might reveal broken mica fronts, badly fitting doors, unsealed flue joints, badly fitted hood plates resulting in draught leakage, and in some cases the cleaning slide and even the soot doors in the chimney left open. The draught should always be tested with an anemometer, and if found to be inadequate the consumer advised to seek means of improving it.

In the case of the smallest boilers the trouble is that if given sufficient draught to maintain combustion they are completely burnt out before morning owing to lack of fuel. The remedy is to recommend a night hopper in order to increase their capacity, the grading of the fuel being such as to avoid bridging or hanging. I think I have said enough to indicate to you that this complaint is one of the major problems, and its investigation embraces most of the points of both the examination of the fuel and the installation. It is the crucial test of the failure or success of your fuel, for if you can maintain satisfactory combustion throughout the night, the day burning is comparatively easy; and much as we whose job it is to be in daily contact with these things would welcome any advance in design which would result in improvement, we are, nevertheless, faced with the fact that for some time to come we shall have to deal with the apparatus as we find them to-day. Improvement, therefore, had best proceed along the lines of the adaptation of the fuel to the boiler; much has been done; much more, I am sure, can be done.

Excessive Ash and Dross Residue.

This, of course, is attributed to variations in the type of coal carbonized, and although it is impressed upon the consumer that these variations in ash content cannot be avoided, if the trouble is very pronounced it is advisable to exchange the fuel.

A high ash content in coke can be very troublesome, and have far-reaching effects, influencing the working of the boiler in many ways. If the ash has a normal or high fusion point, but is excessive in quantity, it accumulates to such an extent in the lower layers of the fuel bed as to have the effect of completely or partially excluding the primary air admission, thereby putting the fire out unless constantly raked during the daytime. As this is impossible during the night the result is obvious and is one of the causes of night failure.

If, on the other hand, it has a low fusion point, the result is excessive clinker formation at normal working temperatures and in extreme cases even when closed down to the night setting. This clinker is typified by flowing in a thin layer, completely covering the bottom bars, with an excessive amount of ash adhering to the underside, this again has the effect of excluding the air admission. It is more friable than the rounded glass hard clinker of high temperature formation and can be easily broken with the fingers.

Where the trouble is not too pronounced and the consumer agrees to use up the delivery a small allowance should be made.

Excessive Clinker Formation.

I would almost describe this as a seasonal complaint of which one hears a great deal in the winter and very little in the summer.

Let us take first of all the probability of the fuel being to blame. Excessive breeze and high ash content of low fusion point would have the effects as already stated. Next comes the possibility of the coke being of such high density, close structure, and hardness, together with little or no volatile content, as to result in a very high ignition point—requiring a very fierce draught to maintain combustion and thereby raising even a normal ash through its fusion range to the clinkering point. The consumer cannot be held responsible for this, and the result is unavoidable if the boiler is to be kept alight. The fuel should therefore be exchanged.

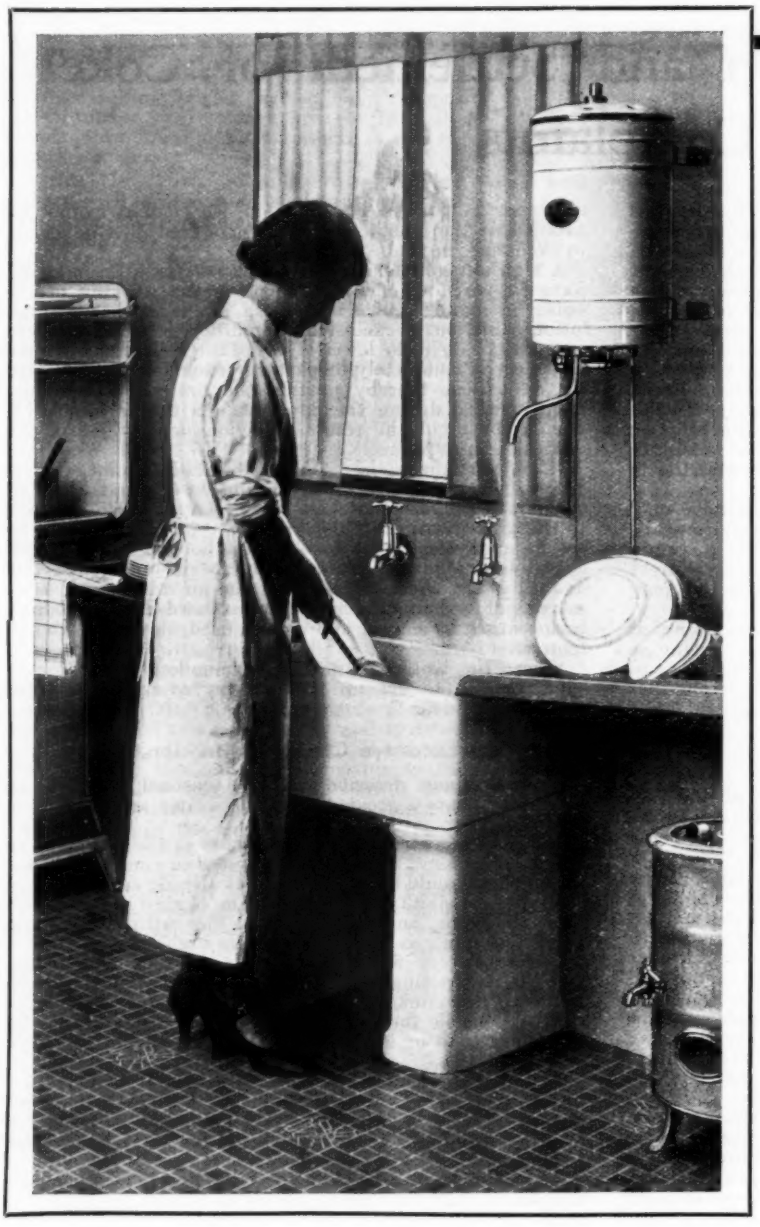
If your examination of the coke proves it to be in appearance a good sample possessing all the virtues, your next step is to inquire as to the method of working the boiler, regulation, &c., what is required of it, and, most important of all, ask to be shown a sample of the clinker, your examination of it will help you to decide whether high temperature or low fusing ash is to blame. During this time you will naturally have been using your eyes, and observing the actual conditions prevailing, condition of the installation, position of the dampers, temperature of the fuel bed, &c.

When I said this was a seasonal complaint, let us imagine it to be a normal winter day, a good delivery of fuel, an Ideal " O " boiler, chimney damper and air admission full open, information received that five or six baths are required, together with a large amount of hot water for washing, &c., within a couple of hours; there are three radiators in the circulation, a 30-gallon storage cylinder, some cooking is done on the boiler, clothes are dried round it, it is the only means of heating a fairly large kitchen, and the maid sits in front of it in the evening. I can assure you this is not imagination by a long way but frequently the case, and the consumer has to be politely but firmly advised that clinker will be always with them no matter what fuel they use unless a larger boiler is installed. These people will clinker merrily winter and summer.

Occasionally, but not often, ignorance of boiler regulation is the cause, it being imagined that it is necessary to run the boiler on constant full draught. An explanation and demonstration will generally put matters right, and here arises an excellent opportunity of displaying those qualities of tact, patience, and good humour before mentioned, especially where the consumer insists that the fuel is to blame.

It is quite possible that during your visit you will find that, in addition to the fuel being a good delivery, the boiler is being worked at quite a slow rate and comparatively low temperature, but the clinker is undoubtedly of high temperature formation. Inquiry will generally reveal

* From a paper read by Mr. F. C. Ashley, of the Gas Light and Coke Company, to the Coke Salesmen's Circle Meeting at Beckton on June 28, 1934.



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that there are intermittent demands for large quantities of hot water during which period the clinker is formed through pushing the boiler. In this case the consumer has to be informed that the result is not due to the fuel and cannot be avoided.

Although it can be presumed that the demand for washing and bathing water from a domestic boiler should be the same in summer as winter, the fact that complaints of clinker are much fewer in summer may be due either to the mains water temperature being higher, thereby requiring less heat application, or to boilers not being depended upon to supply warmth for the kitchen—also not forgetting that central heating boilers are out of action and that gas is being increasingly used as an auxiliary to the coke boiler during the summer.

In passing, let us not forget another type of seasonal complaint. About the beginning of May there is generally a small batch of communications to the effect that since the last delivery of coke they have experienced difficulty in keeping the hot water boiler alight on the normal setting. Investigation generally reveals two boilers, central heating and hot water, running in tandem as I call it, either with their flues coupled or leading into the same chimney.

While both are alight all is well, but when the central heating boiler is let out and the dampers left open as is invariably the case, it is a different story. Closing all dampers on the central heating boiler puts things right at once.

Difficulty in Lighting.

This can be due either to high moisture, structure—that is, a close smooth surface of general hardness—and density (your examination of the fuel will decide which), ignorance of how to lay a fire correctly (in which case advice should be given), or inadequate draught.

It often happens, however, that a coke which has excellent general burning qualities does not respond readily to initial ignition by the ordinary methods of wood and paper, but would do so quite satisfactorily with a gas poker. I have always been of the opinion that unremitting efforts should be made by everybody concerned to install a gas poker to every boiler, thereby eliminating one of the chief causes of complaint and raising coke as a fuel to a much higher level with the public. The campaign should be particularly directed to builders to induce them to put gas points in the vicinity of the boiler.

The great advantage is that the user can let the boiler out when required during the summer and re-light it again with certainty and the minimum of trouble, without the necessity of raking out and re-laying the fire.

Shale.

When the amount of shale in the coke is excessive it can be a great nuisance, and the cause of the strongest complaints received. Frequently you will find it in visible and separate form in the fuel, but often you will be unable to detect it by reason of the fact that it is involved in the structure of the coke. The consumer usually refers to it as " stones and rubbish " with some justification and maintains that an inferior quality of fuel has been delivered.

In bad cases an exchange is essential; in others an adequate allowance in fairness to the user, for it is an inert of no calorific value, thereby reducing the heating value of the fuel in addition to causing great inconvenience and annoyance.

Coke Too Large or Too Small.

This may have been ordered by the consumer in ignorance of the correct grade to give the best results on his boiler. The indications of the London and Counties Coke Association as to correct grading for various boilers should be closely followed, for this matter has received careful attention.

In the case where broken coke has been delivered for one of the smallest boilers, and will obviously be a source of trouble and disappointment, it often pays to exchange it for nuts, thereby impressing the consumer with the Company's desire to help, and resulting in the retention of business which might otherwise be lost. Personally, I would like to see the type and size of boiler recorded on every contract taken, thereby enabling the order department to assist the consumer in obtaining the correct grade and reducing the number of avoidable complaints.

Discussion.

Mr. W. L. Boon (who was in the chair) said that the author referred to the question of keeping in a boiler all night as a major problem, which it undoubtedly was. He could not agree, however, that they should continue to be satisfied with the idea of adapting the fuel to the appliance. He could not help but feel that they were rapidly approaching the time when some action must be taken to adapt the appliance to the fuel. The appliance makers had undoubtedly taken advantage of the fact that they were continually striving to produce a fuel which would be satisfactory to the consumer. The appliance makers, on the other hand, were producing appliances on mass production lines of such small size and of such inadequate character that they were unsatisfactory to clients with any type of fuel. All there should make every individual endeavour to persuade builders, merchants, and consumers, in every way they could, of the folly of purchasing these inadequate boilers.

He would like to ask Mr. Ashley what his experience was with regard to the open front domestic boiler. Did he find that the open front was really a valuable feature, because in his view the domestic coke boiler would be a better boiler without the provision of an open-fire feature, which was trying to make one appliance do two duties, neither of which it did efficiently?

Mr. Ashley stated that the open-fire feature was dependent on circumstances, and that in some houses the domestic boiler was called upon not only to provide hot water, but to dry the clothes, consume the rubbish, and provide the fireplace for people to sit round. He stated that in such cases the purchasers of domestic boilers would not buy without this feature, although the number might not be considerable. He agreed that the boiler for the dual purpose would not be so efficient as a domestic boiler without the open-fire feature, but he felt that particularly in small dwellings the demand for the open-fire fitments would continue.

With regard to the hoppers for night duty, he stated that the customer did not always follow their advice and obtain one of these hoppers, so that the all night duty would be assured; but it was definite that if the small boilers were provided with hoppers the period of operating time would be considerably increased.

Mr. Tucker stated that there were many conflicting statements made with regard to the use of the gas poker for lighting domestic boilers, and he had heard it said that a domestic boiler could be ignited by means of a gas poker in three minutes. He thought that this was a gross exaggeration, and he would like to put on record that the time for lighting was more like ten minutes. He agreed that the use of a gas poker was of very great benefit to the consumer, and those clients who had taken gas pokers were very pleased with the results, as they cut out such an amount of labour. Also, the fire could be let out at any time and if necessary easily re-ignited without having to relay the fire.

Mr. E. W. L. Nicol (Technical Adviser to the London and Counties Coke Association) stated that a poker could be inserted in a hole at the front of the boiler, and that all boilers should be provided with such facilities for using a gas poker. If a special lighting hole were not provided then the gas poker should be inserted under the grate. When using the gas poker it was always advisable to have the boiler front closed, so that the effect of the draught could assist the quick ignition of the fuel; otherwise gas would naturally be wasted. He thought, further, that the open-fire feature on domestic boilers, while it would be of some attraction, could not be an effective coke fire, and neither was the boiler under such circumstances an efficient boiler. He thought that trying to take two separate duties out of one unit was fundamentally wrong. Also, many of the grates which were provided for the small domestic boilers were quite inadequate for burning coke effectively. In this connection, he stated that a coke-burning shaking grate which might readily be exchanged for the existing grate, and also a fuel hopper, designed to fit many small boilers, had been provided by the London and Counties Coke Association, especially for the smaller " Ideal " boilers. These had proved very effective. It would be better still if the grates provided in all boilers could be made of the coke-burning, shaking, and dumping variety, so that the necessity of cleaning out ash and clinker by means of the poker could be avoided.

With regard to the gas poker, Mr. Nicol suggested that builders should be persuaded to provide a gas point near the boiler, so that a gas poker could always be used, as the benefits of such an appliance were very great, and considerably curtailed the labour of the housewife.

Mr. Ashley, in reply, stated that he thought the provision of the exchange grates was a very good feature, and he would be pleased to have further details of the grates which were already available for this purpose.

He quite agreed with Mr. Nicol in thinking that the open-fire feature, as provided in the domestic boiler, was not an efficient arrangement, but still he maintained that the demand would continue in very small kitchens.

Mr. Ashley agreed that the provision of a gas point for a poker to all domestic boilers would be advisable. Even supposing that the boiler were not provided with an actual receptacle for the poker, it could, however, be used to good purpose by inserting it in the ash pit.

Mr. F. J. Laws (Tottenham) said that he agreed that the open-fire feature on the small domestic boiler was not conducive to its efficiency as a boiler, but it was so frequently insisted upon in the small household, where it was called upon to warm the kitchen.

In the case where a very large kitchen had been fitted with a coke boiler to replace the old range, the prospective consumer would be advised to fit a radiator also in the kitchen, at a point as far away from the boiler as practicable. This would ensure sufficient warmth without the very damaging " forcing " of the boiler. The point was that this should be done when the boiler was being fitted. He instanced a case, in his Company's area, which occurred last year. A boiler was fitted in March,

and before the end of the year it had fractured and had to be renewed, due to constant boiling and consequent stoppage of the flow and return pipes by deposited scale. The boiler was of ample size to take the additional radiator.

On the point of clinker trouble in the industrial field, he would like to ask Mr. Ashley whether he had had to deal with "sticky" or "plastic" clinker, which was very much more difficult to remove from firebars than hard clinker from a higher fusion point ash. He (Mr. Laws) had always recommended the use of steam jets under the firebars for industrial boilers, but he would be interested to hear of Mr. Ashley's experiences on this point.

Mr. ASHLEY, in his reply, stated that the question of clinker was very largely dependent upon the method of operating the boiler, and where the fire was forced to a considerable degree clinker would inevitably occur. In the case of clinker for larger boilers, say, in the industrial field a steam jet arrangement under the bars was generally effective in alleviating troubles of this character, as it kept the bars cool and prevented the clinker adhering to them.

Corporation Undertakings' Results

Darwen.

The annual report for the year ended March 31, 1934, shows that the gas sales amounted to 167,374,000 c.ft.—an increase of 454,200 c.ft. The total amount of gas made was 189,745,000 c.ft., being 18,438 c.ft. per ton of coal carbonized. The net income from residuals, after deducting the cost of handling, was £5,112, as against £6,497, this decrease being due to the greatly reduced quantity of coal carbonized. The report remarks that the coke produced from the new vertical retort installation is of such a high quality that no difficulty has been experienced in its disposal. The number of new services connected during the year was 38, while 476 yards of new main were laid, making a total mileage in the area of almost 52. The number of consumers at March 31, 1934, was 11,320—an increase of 33—of whom 3,967 have prepayment meters. There are 1,010 street lamps in the district lighted by gas, and owing to the revised scale of charges the cost of gas for street lighting has been reduced by £483. The report also comments on the successful results of the new vertical retort installation, which was put to work on May 2, 1933, the guarantees having been exceeded. The gross profit for the year shows a small increase at £8,482, while the net profit at £5,717 shows an increase of £2,155.

Dewsbury.

The Undertaking reports a successful year, yielding a gross profit of £17,700, an increase over the previous year of £3,800. Revenue from gas sales increased by £700 and from residuals by £1,500. Benzole yielded a revenue of £2,100. Income-tax cost £3,737, and £5,279 was paid to the rates. From the year 1936, sinking fund charges will be reduced by £7,000 per annum.

Falkirk.

The output of gas for the year ended May 15, 1934, was 410,603,000 c.ft., equal to 1,765,593 therms as compared with an output in the previous year of 378,994,000 c.ft., equal to 1,629,674 therms, an increase this year of 31,609,000 c.ft., equal to 8·34%. The total quantity of coal carbonized was 20,918 tons. The average make of gas per ton of coal used was 19,621 c.ft., and the quality of the gas was 423·5 B.Th.U.

Hinckley.

The annual report and statement of accounts for the year ended March 31, 1934, showed a gross profit of £12,142 and a net profit of £1,992 on the year's working. The report of the Manager, Mr. A. B. Britton, showed that the profit of £12,142 was a record for the Undertaking. The increase in the number of consumers for the year was 384 or 4·86%, and there was an increased consumption of 4,860,100 c.ft. The total gas made during the year had amounted to 251,564,000 c.ft., and 14,479 tons of coal had been carbonized, an increase on the previous year of 577 tons. The gas sold was 226,335,500 c.ft. The number of meters fixed was 8,288, as against 7,904 for a year ago, and the total number of cookers in use was 6,684, an increase of 403. The total revenue for the year was £48,291, of which the sale of gas realized £38,666, coke £6,957, and tar £1,643. The revenue from gas showed an increase of £1,209 16s. 6d.

Lockerbie.

The amount of gas made last year was 19,885,400 c.ft., compared with 19,960,700 c.ft. for the previous year. The coal carbonized totalled 1,654 tons, as against 1,681 tons, while the amount received for coke was £883, compared with £828. Residuals brought in slightly less at £358. Showroom sales produced £391, compared with £840 last year, when an exhibition was held.

Nantwich.

The quantity of gas sold during the year ended March 31, 1934, was 65,098,500 c.ft., which represents a decrease of 0·3%. The quantity of coke produced for sale shows an increase of about 200 tons as compared with the previous year, but the market value was considerably lower, with the result that the income from this source for the year was lower. The balance on the gross revenue account, after expending £727 on renewals, was £8,357. The net profit on the year's working was £1,943, against £1,341 for the previous year.

Manchester.

The annual report for the year ended March 31, 1934, shows a net profit on the year's working of £148,806. The quantity of gas sold and accounted for was over 6,518 million c.ft., which together with the estimated consumption short read in connection with the ordinary meters, due to the introduction of the continuous billing system, amounted to 6,688 million c.ft., a decrease of 2·47% compared with the previous year. The reduced sales are due to the continued depression in trade, together with the mild weather experienced last winter, and to the improved efficiency of gas consuming appliances. The average price realized was 3s. 4·57d. per 1,000 c.ft. sold, excluding income for thermal value extracted in benzole, &c., production, and 8·86d. per therm sold, including income for such extracted thermal value. The income from coke has been reduced by £12,677 when compared with last year, which is accounted for by the decreased quantity available for sale and the competition from the furnace coke manufacturers. The demand for graded coke for domestic use continues to be well maintained. The average price received for tar was 44s. 9d. per ton compared with 42s. 1d. for the previous year, but there was a decrease of £1,570 in the total income due to reduced production. The deficit of £4,159 on the sale of sulphate of ammonia, &c., is attributable to overproduction in general and the continued depressed state of the demand for this product. The recovery of benzole and solvent naphtha has been in operation during the year at all works other than Droylsden, and the increased income from this source amounts to £9,149. In addition, £10,529 has been credited to the sales of gas account.

Smethwick.

The annual report for the year ended March 31, 1934, shows that the net revenue from sales of gas was £120,527, an increase of £4,039 on the previous year's figures. The average net price for all gas sold during the year was 2s. 11·99d. per 1,000 c.ft., as against 3s. 1·59d. for the preceding year. This reduction in the average price is wholly occasioned by the increase in sales for industrial purposes. The total quantity of gas sold and accounted for was 803,690,200 c.ft., an increase of 59,986,300 c.ft., or 8·07%, as compared with the previous year. The gross profit for the year carried to net revenue account is £38,629, as compared with £38,582 for the previous year, an increase of £47. After taking credit for sundry items of income, the net profit for the year is £8,821. After taking into account the surplus of £747 brought forward from the previous year, there is now an available balance of £9,493. During the past five years, over 8,000 gas cookers and domestic appliances have been installed in the borough.

Southport.

The annual report shows that the gas consumed within the area of supply was 804,412,700 c.ft., a decrease of 3,665,300 c.ft. upon last year's figures. The average price received for all gas supplied was 7·81d. per therm, which is equivalent to 36·72d. per 1,000 c.ft. This is 0·14d. per 1,000 c.ft. higher than last year's figure. The total capital outlay was £700,267, and the net capital indebtedness on March 31 was £264,991. The gross profit for the year amounted to £56,457, and after paying interest and sinking fund, income-tax, &c., amounting to £51,471, there remains a net profit of £4,986. Adding to this the balance of £13,713 brought forward from the previous year, the total amount to the credit of the appropriation account is £18,699. The sale of appliances during the year amounted to £15,011. Revenue obtained from residual products was: Coke, £16,637, a decrease of £156 on the year 1933; tar, £5,573, a decrease of £1,703; and concentrated ammonia shows a decrease of £133. The maximum and minimum makes of gas during twenty-four hours were 3,589,000 c.ft. and 1,857,000 c.ft. respectively. The total quantity of gas sold during the year was 804,297,800 c.ft., representing a decrease of 0·4% on last year's figures. The number of new cookers installed was 915 on hire purchase. The total number of gas fires fixed was 794. During the year 735 new service pipes were laid and 3,528 new meters fixed; the total number of meters in use at the end of the year being 27,939, an increase on the previous year of 763. The price of gas to the Sewage Department has been reduced from 2s. 9d. to 2s. 3½d. per 1,000 c.ft. A large measure of success is also reported in the new central lighting of three of the main roads in the Borough.

Stoke-on-Trent.

The total expenditure for the year ended March 31, 1934, was £223,101, while the income amounted to £300,630. During the year the Undertaking carbonized 100,709 tons of coal, the make of gas per ton of coal being 15,107 c.ft. The total gas made was 1,836,984,000 c.ft. The general increasing consumption

during both the summer and winter periods can readily be gauged by the record maximum delivery which occurred on Dec. 20, 1933, and reached a total of 7,484,000 c.ft., as against 6,875,000 c.ft. for the year ended March 31, 1933, while the minimum quantity sent out on any day was 3,019,000 c.ft., against 2,714,000 for the previous year. The most outstanding feature of the Department's activities during the past year has been the construction and bringing into operation of the crude benzole and rectification plant. This plant was designed for the production of 200,000 gallons of pure benzole products per annum, and included a modern type of multi-film washer capable of dealing with the debenzolizing of 8 million c.ft. of gas per day. To meet local demands a 1,000-gallon motor road tank has been purchased for the conveyance of the motor spirit, and a special pump installed for supplying small quantities to private motorists. The plant was brought into operation on Feb. 5 and has functioned satisfactorily, the yields per ton of coal carbonized being higher than originally anticipated. The total quantity of crude benzole, made since commencing to March 31, was 59,765 gallons, equal to a yield of 3·70 gallons per ton of coal carbonized over that period. The number of consumers now total 66,032, an increase of 2,068. A point of interest is the extending popularity of the automatic meter, the number in service being 2,334 higher than last year, while the ordinary meters in commission show a corresponding decrease of 266. The quantity of gas consumed on public lighting was 71,497,724 c.ft., against 63,451,842 c.ft. last year, and the quantity supplied free for this purpose 11,408,946 c.ft. (equal to a financial contribution of £1,497) compared with 8,666,159 c.ft.

Workington.

The financial results for the year to March 31 last show a net profit of £1,966, against a net profit of £1,121 for the previous year. The gas produced during the year amounted to 199,780,000 c.ft., or 859,054 therms, an increase of 2·07% over the previous year and a record for the Undertaking; no doubt the exceptionally mild winter affected the consumption of gas otherwise the production would have exceeded 200 million c.ft. The gas produced per ton of coal carbonized was 20,200 c.ft., equivalent to 86·86 therms; the gas sold per ton of coal carbonized being 18,880 c.ft., or 81·18 therms. The average calorific value of the gas supplied during the year was 430·5 B.Th.U. The net return from the sale of residuals is 38·85% of the cost of the coal, against 39·32% for the preceding year. The decrease is due to a reduced revenue from tar, owing to the fall in tar prices during the year. The number of appliances supplied by the distribution department during the year was as follows: Cookers, 135; gas fires and radiators, 99; gas wash boilers, 141; gas water heaters, 20; hotplates, 190; gas irons and boiling rings, 356.

Gas Companies' Results in 1933.

Berwick and Tweedmouth.

After carrying £360 to general reserve account and setting aside £1,000 for the provision of greater gas storage as a safeguard against any unavoidable stoppage, the net profit realized amounted to £3,323. The Directors recommend a dividend of 5½%, free of income-tax, upon the £32,580 issued capital of the Company. This will absorb £7,191, and the remaining £531 they propose should be carried forward to next year's account together with a balance brought forward from 1933.

Galashiels.

The hundredth annual general meeting of the shareholders of Galashiels Gas Light Company was held last week, when the Chairman, Mr. George Carruthers, made reference to the great progress which had been made by the Company. Their output was the highest on record, being now 113 million c.ft., or more than six times what it was in 1868, when the new works were erected at Galafoot. The price of gas was now 3s. per 1,000 c.ft., with a discount of 15% for certain purposes, as compared with 5s. 10d. per 1,000 c.ft. in 1868. The net profit for the year was £2,965, and he moved that a dividend of 6%, free of income-tax, be paid.

Wells.

The Directors of the Wells Gas Light Company submit their 101st annual report for the year ended March 31, 1934, which states that they decided to mark the centenary of the Company by reducing the price of gas and adopting a new system of reduced charges known as the "Block System." The declared value of gas supplied has been raised from 450 to 475 B.Th.U., and good results are expected from these changes. There was an increase in the sales of gas by 1,267,800 c.ft. The gross receipts for the year amounted to £14,184, and the expenditure to £10,917, leaving a balance profit of £3,266, as compared with £3,821 in 1933. The credit balance of profit and loss account to be carried to the next account is £2,713. The Directors recommend the payment of final dividends for the year as follows: On ordinary and preference stock at the rate of 2½%; on new (1925) preference stock at the rate of 3¼%, making with interim dividends paid in December, 1933, 5% and 6½% for the year, less tax. After placing £480 16s. 10d. (*vide* Section 3 "Gas Undertakings Act, 1929") to the credit of renewal fund, the balance is carried forward to the credit of next year's account.

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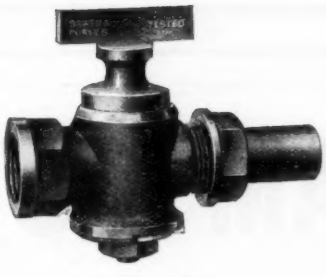

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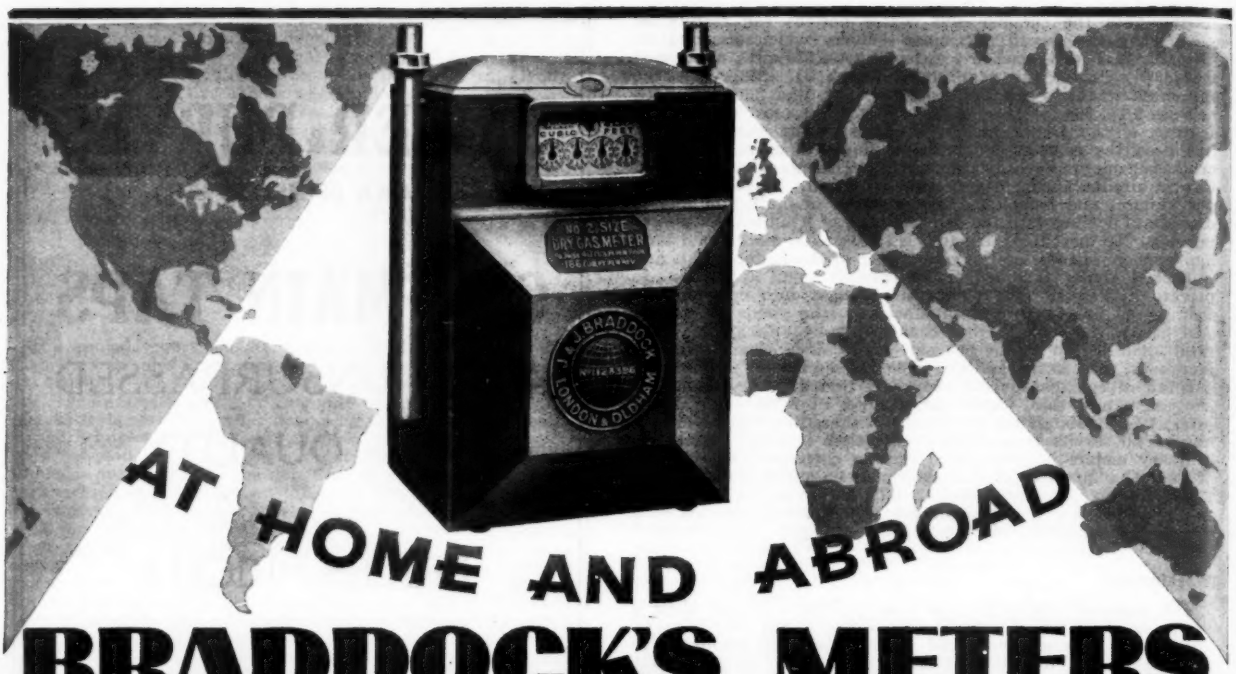

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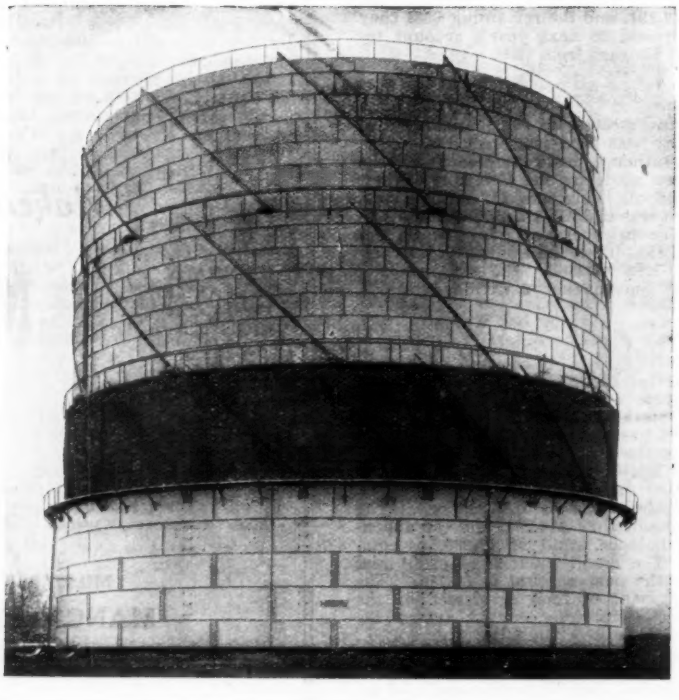

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GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

Business on the Stock Market last week was on a reduced scale in most departments, though the general tone continued firm and confident. One of the few exceptions was the Rubber market, in which, under the influence of a rise in the price of the commodity, renewed activity set in and share values advanced. Most of the leading banks have announced their interim dividends, and it is satisfactory to note that these are maintained at last year's rates.

As a contrast to the quieter conditions prevailing in many other sections, the volume of business in the Gas market was heavier than for some weeks past, and prices remained firm. It will be seen in the Stock and Share List that several quotations were marked up, the highest of these being British 7% preference with a gain of 3 to 156½, while European ordinary and Commercial 3% debenture both improved 2 to 125½ and 82½ respectively.

Several interesting new offers for the acquisition of gas stocks were made during the week, the most important of these being that by the South-Eastern Gas Corporation, which has made an offer to purchase the whole of the issued ordinary stock of the Hastings and St. Leonards Gas Company. The terms are as follows: For each £100 (nominal) Hastings 5% converted stock either (1) £165 in cash, or (2) 50 redeemable 4½% £1 cumulative preference shares and 80 £1 ordinary shares of the Corporation, the present market value of which is round about £170. For each £100 (nominal) 3½% converted stock of the Company either (1) £130 in cash, or (2) 50 preference shares and 55 ordinary shares of the Corporation, the present market value of these being about £136. For each £100 (nominal) 5% additional stock of the Company either (1) £151 in cash, or (2) 50 preference shares and 70 ordinary shares of the Corporation with a present market value of £158. The offer remains open until July 20 next, and is conditional upon its acceptance by the holders of at least 55% of the nominal value of the two stocks of the Company.

In order to finance its new enterprise, the South-Eastern Gas Corporation has convened a meeting for July 18 to authorize the increase of the existing capital to £2,500,000 by the creation of 250,000 £1 ordinary shares and 250,000 £1 4½% cumulative preference shares to rank *pari passu* with the existing preference shares.

Another offer is that by the Severn Valley Gas Corporation, Ltd., which is seeking to purchase the issued ordinary stock of the Gloucester Gas Light Company. For each £100 (nominal) of the company's 5% maximum stock holders are offered either (*a*) £120 in cash, or (*b*) 112 Severn Valley 4½% £1 cumulative preference shares, or (*c*) 50 preference shares, together with 60 £1 ordinary shares of the Corporation.

Current Sales of Gas Products.

The London Market for Tar Products.

LONDON, *July* 9.

The Tar Products market has been quiet during the past week, and prices generally are unchanged as under.

Pitch is 58s. to 60s. per ton f.o.b.

Creosote 4d. to 4½d. per gallon.

Refined tar 4d. to 4½d. per gallon in bulk at makers' works.

Pure toluole is 2s. 4d. to 2s. 5d.; pure benzole 1s. 9d. to 1s. 10d.; 95/160 solvent naphtha 1s. 7d. to 1s. 8d.; and 90/160 pyridine 7s. to 7s. 6d.—all per gallon at makers' works.

Tar Products in the Provinces.

July 9.

The average prices of gas-works products during the week were: Gas-works tar, 25s. to 30s.; Pitch—East Coast, 55s. to 57s. 6d. f.o.b. West Coast—Manchester, Liverpool, Clyde, 55s. to 57s. 6d.* Toluole, naked, North, 1s. 9d. to 1s. 11d. Coal-tar crude naphtha, in bulk, North, 6½d. to 6¾d. Solvent naphtha, naked, North, 1s. 5½d. to 1s. 6d. Heavy naphtha, North, 10d. to 11d. Creosote, *ex* works, in bulk, North, liquid and salty, 3½d. to 3¾d.; low gravity, 3¼d. to 3½d.; Scotland, 3⅝d. to 3⅞d. Heavy oils, in bulk, North, 3⅞d. to 4¼d. Carbolic acid, 60's, 1s. 11d. to 2s. 1d. Naphthalene, £10 to £11. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2½d. to 3d. per minimum 40%, purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *July* 7.

The market remains quiescent. While makers' quotations are practically unchanged, lower prices would probably be accepted for certain products.

Crude gas-works tar.—Actual value is 34s. to 36s. per ton *ex* works in bulk.

Pitch.—Values are purely nominal at 45s. per ton f.o.b. Glasgow for export and round 42s. 6d. per ton *ex* works in bulk for home trade.

Refined tar.—Conditions are unchanged with price at 3d. to 3¼d. per gallon f.o.r. naked.

Creosote oil.—Supplies are relatively scarce in this district. B.E.S.A. Specification oil is 4d. to 4¼d. per gallon; low gravity, 4¼d. to 4⅜d. per gallon; and neutral oil, 4¼d. to 4½d. per gallon; all f.o.r. makers' works in bulk.

Cresylic acid.—The situation is unchanged. Pale, 97/99%, is 1s. 2½d. to 1s. 3½d. per gallon; dark, 97/99%, 1s. to 1s. 1d. per gallon; pale, 99/100%, 1s. 4d. to 1s. 5d. per gallon; f.o.r.

Crude naphtha.—Available supplies are scarce and command 4⅜d. to 5½d. per gallon, according to quality.

Solvent naphtha.—90/160 grade is 1s. 3d. to 1s. 4d. per gallon, and 90/190 is purely nominal at round 8d. per gallon.

Motor benzole.—Supplies being infinitesimal price is called 1s. 5d. to 1s. 6d. per gallon.

Pyridines.—90/160 grade is now 6s. to 7s. per gallon, and 90/140 grade is 7s. to 8s. per gallon. Supplies are not available in this district at present.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s.	d.			d.	
Crude benzole . . .	0	9	to	0	9½	per gallon at works
Motor ,, . . .	1	3½	,,	1	4	,, ,, ,,
90% ,, . . .	1	4	,,	1	4½	,, ,, ,,
Pure ,, . . .	1	7½	,,	1	8	,, ,, ,,

Trade Notes.

The Dressing and Screening Company, Ltd.

The Dressing and Screening Company, Ltd., of Alfreton, Derbyshire, have just published literature on the subject of their screening plant, sieves, sieve grates, and perforated plates.

James Keith & Blackman Company, Ltd.

Messrs. Keith-Blackman have sent us a copy of their revised K 25 Paddle Wheel Fan Booklet, which gives details of their Paddle Wheel fans, settlers, and filters. These fans are particularly suitable for dealing with wood refuse, textile dust, or other material of a clogging nature.

Falk, Stadelmann, & Co., Ltd.

Messrs. Falk, Stadelmann, & Co., Ltd., have published a new Gas Cooker Catalogue, which describes the full range of their re-designed "Bakerloo" cookers in grey mottle as well as in other attractive colours, which are shown under the name of "Superl" Bakerloo. An interesting feature shown in the catalogue is the patent dual-purpose circular grill and boiling burner.

Cambridge Instrument Company, Ltd.

We have received from the Cambridge Instrument Company an illustrated folder, describing their automatic regulators, which are suitable for many industrial purposes. Of particular interest is their potentiometric controller, with an automatic three-position switch to control three furnaces or sections of one furnace at three different temperatures within the range of the instrument.

Contracts Advertised To-Day.

Benzole Plant.

Ashford (Kent) Gas Department. [p. 116.]

Coal.

Newcastle-under-Lyme Gas Department. [p. 114.]
Newtown (N. Wales) U.D.C. [p. 116.]
Workington Gas Department. [p. 116.]

Pipes.

City of Leeds Gas Department. [p. 114.]

Wagons, Hire of.

Stockport Gas Department. [p. 114.]

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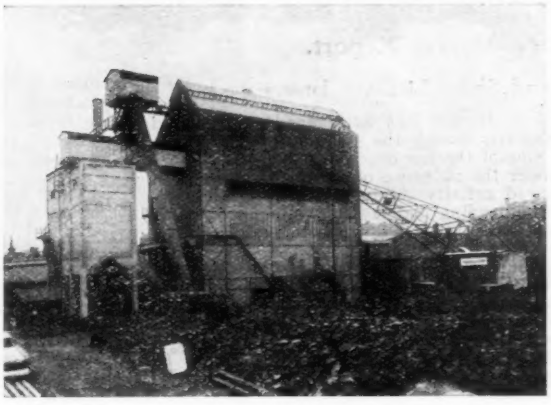

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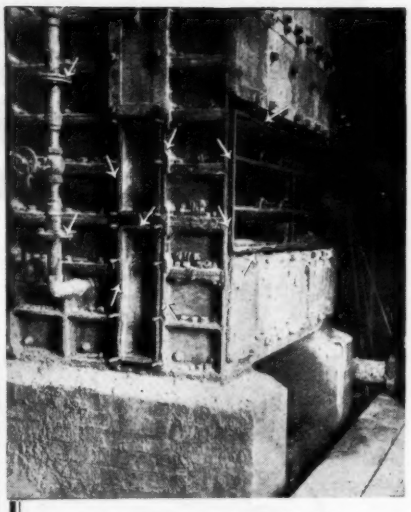
STOCK AND SHARE LIST.

Official Quotations on the London and Provincial Stock Exchanges.

Issue. £	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations July 7.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
1,551,868	Stk.	Apl. 9	7	7	Alliance & Dublin Ord. ...	128–138	...	135½–137
374,000	,,	June 25	4	4	Do. 4 p c Deb. ...	90–100*	...	
557,655	,,	Mar. 5	7	7	Barnet Ord. 7 p.c.	167–172	...	170–172
300,000	1	May 7	1/4⅛	1/9⅛	Bombay, Ltd.	27/6–29/6	...	28/6
178,480	Stk.	Feb. 19	9½	9½	Bournemouth sliding scale	203–208	...	...
550,050	,,	,,	7	7	Do. 7 p.c. max. ...	165–170	...	168–170
439,160	,,	,,	6	6	Do. 6 p.c. Pref ...	142–147	...	145½–146½
50,000	,,	June 11	3	3	Do. 3 p.c. Deb. ...	78–83	...	...
262,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	103–108	...	...
335,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	119–124	...	...
357,900	,,	Mar. 5	7½	7½	Brighton, &c., 6 p.c. Con. ...	161–166	...	164–165
540,000	,,	,,	6½	6½	Do. 5 p.c. Con. ...	151–156	...	...
195,500	,,	,,	6	6	Do. 6 p.c. B. Pref.	140–145	...	...
1,487,500	,,	Mar. 5	5	5	Bristol 5 p.c. max.	118–120*a*	...	...
120,420	,,	June 11	4	4	Do. 1st 4 p.c. Deb. ...	102–105*a*	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	102–105*a*	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	121–123*a*	...	...
885,000	,,	Apl. 9	7	8	British Ord.	155–160	...	159–160
100,000	,,	June 11	7	7	Do. 7 p c. Pref.	154–159	+3	156
350,000	,,	,,	5½	6½	Do. 5½ p.c. Pref.	104–109	...	...
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	95–100	...	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	107–112	...	...
160,000	,,	June 11	5	5	Cambridge 5 p.c. Deb. ...	115–120	...	...
100,000	10	22 May '33	6	4	Cape Town, Ltd.	2–4	...	2
100,000	10	Nov. 6	4½	4½	Do. 4½ p.c. Pref. ...	5–7	...	...
150,000	Stk.	June 25	4½	4½	Do. 4½ p.c. Deb. ...	93–98*	...	...
626,850	,,	Feb. 19	6	6	Cardiff Con. Ord.	128–133	...	...
237,360	,,	June 11	5	5	Do. 5 p.c. Red. Deb.	103–108	...	...
157,150	,,	Feb. 19	5	6½	Chester 5 p.c. Ord.	112½–122½*b*	...	...
98,936	1	May 7	2/-	2/-	Colombo, Ltd. Ord.	1⅞–1⅞	...	36/-
24,500	1	,,	1/4½	1/4½	Do. 7 p.c. Pref. ...	18/6–20/6	...	...
609,204	1	Mar. 19	-/11'48	/11'48	Colonial Gas Assn. Ltd. Ord.	19/6–21/6	...	...
296,058	1	,,	1/8'30	1/8'30	Do. 8 p.c. Pref.	25/6–26/6	...	...
1,775,005	Stk.	Feb. 19	5	6½	Commercial Ord.	120–126	...	123
475,000	,,	June 11	3	3	Do. 3 p.c. Deb. ...	80–85	+2	85
286,344	,,	Mar. 5	5	5	Do. 5 p.c. Deb. ...	120–125	...	...
807,560	,,	Feb. 19	7	7	Croydon sliding scale ...	154–159	...	154½–156
569,590	,,	,,	5	5	Do. max. div.	105–110	...	108–110
620,385	,,	June 25	5	5	Do. 5 p.c. Deb.... ...	119–124*	...	123½
842,270	,,	Mar. 5	7	10	Derby Con.	175–180*c*	...	...
55,000	,,	June 25	4	4	Do. 4 p.c. Deb.	97–100c*	...	...
209,000	,,	Feb. 19	5	5	East Hull Ord. 5 p.c. ...	106–111	...	...
181,625	,,	Mar. 5	6	6	East Surrey Ord. 5 p.c. ...	126–131	...	...
175,609	,,	June 11	5	5	Do. 5 p.c. Deb. ...	116–121	...	...
1,002,180	,,	Apl. 9	†5	†7	European, Ltd.	123–128	+2	125–12⅞
19,342,768	,,	Feb. 19	5⅜	5⅜	Gas Light & Coke 4 p.c. Ord.	26/10½–27/4½*f*	...	26/10½–27/3
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	87–90	...	87½
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	104–107	...	105⅞–107
6,102,497	,,	May 28	3	3	Do. 3 p.c. Con. Deb. ...	84–87	...	85–86½
3,643,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	115–118	...	117–118
3,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	113–116	...	114½–115½
270,466	,,	Mar. 5	6	6	Harrogate New Cons. ...	125–130	...	...
82,500	,,	Mar. 5	7	7	Hastings & St. L. 5 p.c. Conv.	147–152	...	...
258,740	,,	,,	5⅜	5⅜	Do. 3⅜ p.c. Conv	117–122	...	119–120
140,000	1	Apl. 23	1/7⅛	1/7⅛	Hongkong & China, Ltd. ...	1⅛–1⅜	...	...
218,200	Stk.	Mar. 5	6	6	Hornsey Con. 3½ p.c. ...	128–133	...	...
5,600,000	,,	May 28	10	14	Imperial Continental Cap.	209–214	+1	210½–212½
223,130	,,	Feb. 5	3½	3½	Do. 3½ p.c. Red. Deb.	89–94	...	...
235,242	,,	Mar. 5	8½	8½	Lea Bridge 5 p.c. Ord. ...	169–174	...	...
2,167,410	,,	Mar. 5	6	6	Liverpool 5 p.c. Ord. ...	133–134*b*	+½	...
245,500	,,	June 11	5	5	Do 5 p.c. Red. Pref. ...	101–111*b*	...	...
806,088	,,	Jan. 15	4	4	Do. 4 p.c. Deb. ...	101½–103½*b*	...	...
165,786	,,	Feb. 19	8	10	Maidstone 5 p.c. Cap. ...	180–190	...	...
56,176	,,	June 25	3	3	Do. 3 p.c. Deb. ...	71–76*	...	...
75,000	5	May 28	†10	†10	Malta & Mediterranean ...	...	...	...
393,000	—	Apl. 3	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	98–103	...	...
231,978	Stk.	Feb. 19	5	5	M. S. Utility "C." Cons. ...	113–118	...	...
818,857	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	95–100	...	99
360,075	,,	June 11	4	4	Do. 4 p.c. Deb. ...	100–105	...	...
148,955	,,	,,	5	†5	Do. 5 p.c. Deb. ...	119–124	+1	123
675,000	,,	May 28	†6	‡13	Montevideo, Ltd.	60–65	...	...
2,061,315	,,	Mar. 5	5	5⅔	Newcastle & Gateshead Con.	25/3–26/*l-d*/	...	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	100–101*d*	+½	...
776,706	,,	June 11	3½	3½	Do. 3½ p.c. Deb. ...	90½–91½*d*	...	...
277,285	,,	May 7	5	5	Do. 5 p.c. Deb. '43 ...	105–107*d*	...	...
274,000	,,	Feb. 19	5	5	Newport (Mon.) 5 p.c. max.	107–109*a*	+1	...
204,940	,,	Mar. 19	7½	7½	North Middlesex 6 p.c. Con.	155–160	...	...
393,160	,,	Feb. 5	5	5	Northampton 5 p.c. max. ...	104–109	+1	109
800,000	,,	May 7	†9	†7	Oriental, Ltd.	155–160	...	159
416,617	,,	June 11	8	8	Plym'th & Stonehouse 5 p.c.	167–172	...	170
504,416	,,	Feb. 19	8	8	Portsm'th Con. Stk. 4 p.c. Std	168–173	...	171–172½
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	105–110	...	107½
114,000	,,	Feb. 19	5	5	Preston 5 p.c. Pref.	108–108	...	...
686,312	,,	Jan. 22	4	4	Primitiva 4 p.c. Rd. Db. 1911	87–92	...	...
389,813	,,	June 25	4	4	Do. 4 p.c. Cons. Deb.	87–92*	...	...
150,000	10	Mar. 19	6	6	San Paulo 6 p.c. Pref. ...	7–8	...	...
1,736,968	Stk.	Mar. 19	6	6	Sheffield Cons.	139–141*e*	...	...
95,000	,,	Jan. 8	4	4	Do. 4 p.c. Deb.	101–105*e*	...	...
133,201	,,	Feb. 19	8½	5	Shrewsbury 5 p.c. Ord. ...	135–140	...	...
90,000	10	May 28	†4	‡3	South African	2–4	...	...
6,709,895	Stk.	Feb. 19	5	7	South Met. Ord.	134–137	...	135–137
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	140–145	...	142–144
850,000	,,	,,	4	4	Do. 4 p.c. Irred. Pf.	103–107	...	106
1,895,445	,,	June 25	3	3	Do. 3 p.c. Deb. ...	83–86*	...	85–86
1 000,000	,,	Jan. 22	5	5	Do. 5 p.c. Red. Deb.	114–117	...	...
209,820	,,	Mar. 5	8½	8½	South Shields Con.	166–168*d*	...	...
1,543,795	,,	Feb. 19	6	6	South Suburban Ord. 5 p.c.	131–134	...	132–133½
512,825	,,	,,	5	5	Do. 5 p.c. Pref.	118–123	...	122
300,000	,,	,,	—	4	Do. 4 p.c. Pref.	103–108	...	...
868,837	,,	June 11	5	5	Do. 5 p.c. Deb.	120–125	...	122⅞–123½
100,000	,,	,,	4	4	Do. 4 p c. Deb.	102–107	...	...
647,740	,,	Mar. 5	5	5	Southampt'n Ord. 5 p.c. max.	110–115	...	113½–114½
121,275	,,	June 11	4	4	Do. 4 p.c. Deb.	99–104	...	...
350,000	,,	Mar. 5	5½	5½	Swansea 5½ p.c. Red. Pref.	107–112	...	...
200,000	,,	June 11	6½	6½	Do. 6½ p.c. Red. Deb.	100–105	...	...
1,076,490	,,	Mar. 5	6½	6½	Tottenham and District Ord.	151–156	...	153½–156
409,835	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	126–131	...	...
62,235	,,	,,	5	5	Do. 5 p.c. Pref. ...	115–120	...	117
199,005	,,	June 11	4	4	Do. 4 p.c. Deb. ...	98–103	...	101
85,701	,,	Apl. 9	6	6	Tuscan, Ltd. 6 p c. Red. Db.	90–100	...	...
349,110	,,	Mar. 5	7	7	Uxbridge, &c., 5 p.c. ...	150–155	...	...
88,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	112–117	...	114
1,322,220	,,	Mar. 5	7	7	Wandsworth Consolidated	157–162	...	157–160½
1,096,373	,,	,,	5	5	Do. 5 p.c. Pref.	119–124	...	122½–123½
1,317,964	,,	June 11	5	5	Do. 5 p.c. Deb.	120–125	...	123–123
158,400	,,	Mar. 5	5	6*g*	Winchester W. & G. 5 p.c. Con.	115–120	...	117

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of stock. *g.*—Paid £3, including 10s. on account of back dividends. * Ex. div. † Paid free of income-tax. ‡ For year.



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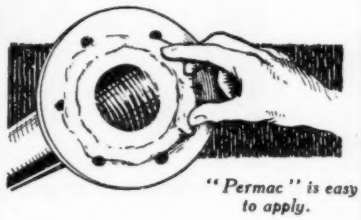

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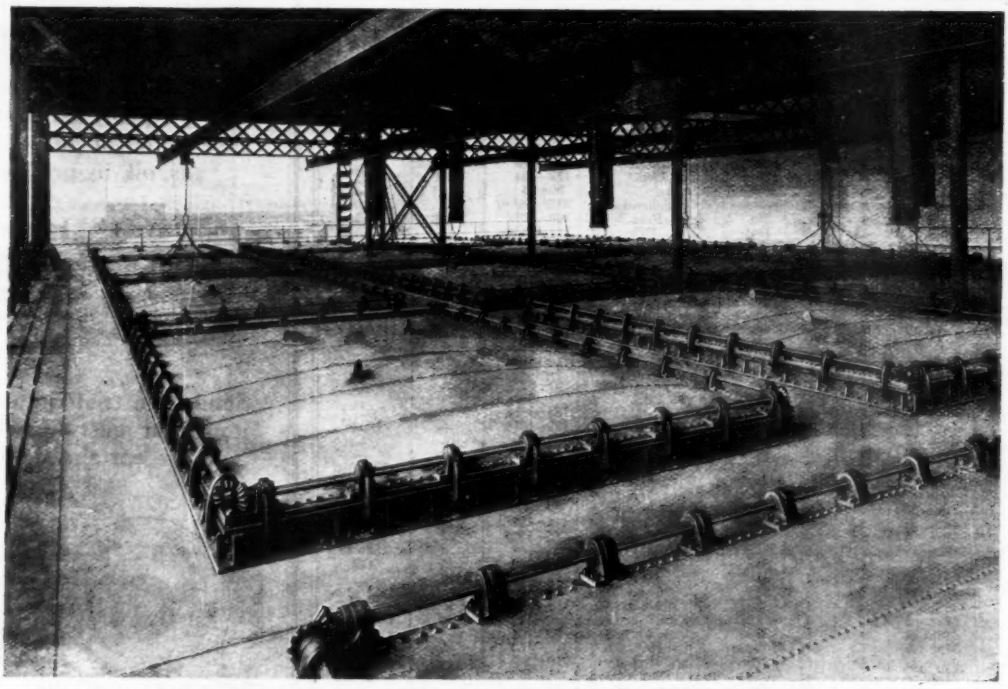

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